1378

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AND
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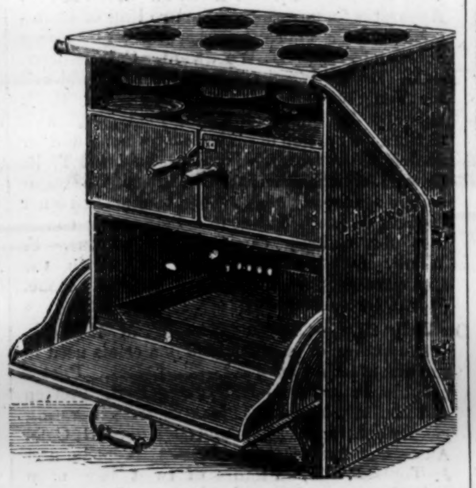

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On July 17th.—2500 to 2512.—J. O'Friel. Manufacture of artificial stone for buildings, floors, and other purposes.—J. H. Johnson. Coal and rock cutting machines (com.)—J. Scott. Hydraulic lifts for ships.—G. Cutler and J. Newman. Buttons for dress fastenings.—A. S Tomkins. Cooking stoves known as "The Victoria cooking stove.—C. D. Abel. Traction springs for vehicles, and the means for attaching the traces thereto (com.)—E. Chiverton. Means of and apparatus for lighting gas lamps or burners.—H. E. Willes. A new motor (com.)—A. McNeille. Drying timber.—W. E. Yates. Shoes employed in the protection of the feet or hoofs of horses, asses, or other animals.—A. Mackie. Apparatus for perforating paper or materials to be used in type-composing machinery, or to be otherwise employed.—J. H. Smith. Sewing machines.—J. H. Johnson. Coke ovens (com.)

On July 18th.—2513 to 2528.—R. Stephens. Parallel double or single locking gear for railway and other points and junctions, and for signal boxes.—W. E. Gedge. Furnace and superheating apparatus for smelting metals in crucibles, and for various uses (com.)—G. Lowry. Registering turnstiles.—C. D. Abel. Steam generators and engines (com.)—M. L. Lion. Apparatus for affixing heels to boots and shoes.—T. Wilde. Construction of railway chairs.—J. Day and W. W. Osgerby. Composition for the removal and prevention of the incrustation in steam boilers.—J. H. Johnson. Separation of ammonia from illuminating and other gases (com.)—W. J. Labett. Apparatus for preventing railway and other trains from leaving the metals, the said apparatus being also applicable as a brake.—P. Jensen. Locomotive engines (com.)—P. Jensen. Fire-proof material and mode of applying the same, more particularly applicable to safes or receptacles containing valuables (com.)—F. S. Brereton. Fire-proof structures, and means for extinguishing fire which may arise in any of the compartments of such or other structures.—A. V. Newton. Smoke-burning apparatus applicable to the fireplaces of locomotive and other engines (com.)—E. van der Straten. Apparatus for the combustion of air and gas for heating purposes.—W. Storer. Machinery and apparatus for operating upon skins, hides, and leather—D. C Gillett. Means of saving life at sea.

On July 20th.—2529 to 2541.—J. F. Spencer and W. Inglis. Compound steam-engines.—T

BRITISH MUSEUM

Perkes. Breech-loading fire-arms.—J. Batty. Apparatus for feeding wool or other fibrous substances to scribbler carding engines.—W. Whitthread. Treating sugar, syrups, and juices for decolorizing and purifying same. —H. H. Murdoch. Manufacture of artificial fuel (com.) H. T. Clubley. Machinery for manufacturing bricks, tiles, drain pipes, or other similar articles from clay, concrete, "bind" shale, or other substances, and which are also applicable for manufacturing blocks of artificial fuel.—A. N. Corroyer. Construction of metallic spring mattresses, sofas, ottomans, chairs, and other articles of furniture (com).—H. A. Bonneville. Machines for spinning wool, cotton, silk, and fibrous material in general (com.) (Complete specification.)—J. R. Alsing. Means and apparatus for pulverizing substances, more particularly applicable to the pulverization of materials for porcelain paste (partly com.)—A. Martin. Apparatus for clipping or shearing animals.—W. E. Newton. Chemical telegraphs and apparatus connected therewith (com.)—B. J. B. Mills. Means to be employed in lieu of the ordinary pendulum and escapements used in clock and watch work (com.)—S. N. Peck. Self-acting releasing coupling for carriages or vehicles.

On July 21st.—2542 to2556.—R. Tucker. Thrashing machines.—P. Jensen. Treatment of peat for fuel (com.)—T. Hook. Sewing machines. —W. Cotter. Advertising on or decorating walls, floors, or other situations or places.—W. Perch and P. Higgs. Pistons of steam, air, gas, or vapour engines, whereby increased surface is obtained.—R. Giebermann. Preparation of superphosphate of lime and manufacture of nitrogenized manures.—J. Griffiths. Piling steel and iron, or mixtures of steel and iron, for the manufacture of rails for railways and tyres for wheels, and for other purposes.—J. Greig and C. Spinks. Mills or apparatus for grinding or reducing grain, seeds, or other granular substances.—T. Hyatt. Metal rods, bars, rafters, and beams for building purposes, and manufacture and application of the same.—T. L. Parker. Slating roofs.—A. Higginson. Motive-power and pumping engines.—H. Hammond and E. Hammond. Apparatus or machinery for holding cartridge cases in filling frames, and for turning them down.—J. Harrington and H. Brent. Gasaliers.—A. M. Clark. Composition or compositions to be applied to steam boilers and other surfaces for preventing the radiation or transmission of heat (com.)—J. Armitage. Feeding carding engines.

On July 22nd.—2557 to 2573.—J. Imray. Production of steel (com.)—W. H. Tucker. Locks and lock furniture.—A. Perry. Apparatus for drying grain, roasting malt and coffee, and for other like purposes.—J. W. Davis and L. Strauss. Fastening the corners of pockets in wearing apparel in order to prevent them from tearing or the seam from ripping (Complete specification.)—D. Fobes. Hooks for threading needles (com.)—A. C. Emery. Waterclosets.—A. M. Clark. Steam pipes (com.) (Complete specification.)—W. McI. Cranston. Reaping machines (partly com.)—E. J. Reed, C.B. Screw propellers and the propulsion of vessels.—F. V. Mouly. Apparatus for heating and ventilating dwelling-houses and other buildings (Complete specification.)—G. Willett. Sewage filter.—H. Y. D. Scott. Preparation of phosphate salts.—W. E. Newton. Gas burners (com.)—W. E. Newton. Steam engines (com.)—F. W. Clark. Apparatus for generating carburetted hydrogen gas.—G. H. Forbes. Manufacture of gas for illuminating and heating purposes.—J. H. Wagstaff. Machinery or apparatus for manufacturing sheet-metal boxes or cases.

On July 23rd.—2574 to 2586.—A. F. Spiller. roller skate.—W. Neill. Hydrostatic fire-extinguishing apparatus. T. R. D. Bingham. Construction of rudders.—D. Elias. Taps or valves to be used for decanting aërated beverages. —C. Wigg. Combined bevil-edged railway key, turn screw, knife, pen and pencil, and cork-screw.—A. M. Clark. Miners' safety lamps (com.)—A. F. Lefévre. Portable heating apparatus.—E. H. C. Monckton.—Pulping, drying, and converting peat into fuel and other useful products, and apparatus and methods necessary for effecting and applying the same (Complete specificaton.)—F. Barnard. Manufacture of embroidery or bordering for shirts and other articles of clothing.—A. Ball. Construction, heating, and ventilating houses and other buildings.—J. H. Johnson. Machines for weaving tape (com.)—J. Bartlett. Platform weighing machines.—J. Reilly. Four-wheeled carriages.

On July 24th.—2587 to 2600.—H. Aitken. Manufacture of illuminating gas, and apparatus or means employed therefor.—W. E. Gedge. Solar compasses (com.)—R. Punshon. Rifling fire-arms.—H. A. Bonneville. Boots and shoes (com.)—H. A. Bonneville. Constructing and mounting various kinds of brooms and brushes (com.)—F. Fleming. Driving belt —T. Hughes. Application of japanned metals to various ornamental and useful purposes. —W. H. Le Mesurier. Apparatus and machinery for making concrete.—E. Fisher. Belt and brace buckles. —J. C. W. Jefferys. Fastening for jewellery and articles of dress.—J. Salmon. Machinery for cutting or perforating paper, cardboard, and other similar substances.—J. Maynes. Machinery for turning and cutting wood, metal, and other materials.—C. Brakell. Apparatus to be applied to looms for weaving velvets and other pile fabrics for the purpose of cutting or forming the pile as the fabrics are being woven; a modification of the said improvements without the cutting action being also applicable for forming the loops or pile in fabrics of the nature of Brussels carpets or other material which can be made thicker by a loop or pile or corrugation.—J. Ivimy. Packing for bottles and other fragile articles and substances com.)

On July 25th—2601 to 2615.—L. Salomons. Weaving machinery (com.)—R. Craig. Under couch roller to be used in that class of paper-making machines commonly called American or "Yankee."—J. Healton. Moulds for casting steel and other metal ingots.—J. A. Lindblad and J. Edey.—Construction, arrangement, and fixing of railway buffer springs, also applicable for other similar purposes.—W. L. Wise. Stop valves (com.)—F. Wirth. Process of "claying" or refining loaves of sugar, and in the apparatus or appliances employed therein (com.) (Complete specification).—J. Kirby and M. E. Kirby. Apparatus for governing or controlling of steam-engines.—T. Thornton. Apparatus for closing doors and gates.—H. Woodward. Coin assorter. —M. Brown-Westhead. Tapes or "ladders" for Venetian blinds.—T. Crawford and E. N. Russell. Telescopic or sliding joints, applicable to the construction of optical instruments and for analogous purposes.—W. R. Oswald and T. R. Oswald. construction and mounting of the steam-boilers of locomotive, portable, traction and otner engines —A. B. Ibbotson. Self-acting couplings for railway carriages and wagons.—F. Wirth. Obtaining motive-power, and in the apparatns employed therein (com.)—J. Stone. Stoves for cooking purposes.

On July 27th.—2616 to 2624.—W. M. Murdock. Manufacture of steel, and of materials used in the manufacture of steel.—T. Lester. Photographic apparatus.—J. Gaukroger, S. Fielden and A. Aitchison. Apparatus for generating gas for lighting, heating, and cooking.—H. Cole. Automatic fire alarm (com.)—A. Topham and J. Topham. Manuftcture of twist lace upon twist lace machines.—J. Gamgee. Refrigerating or freezing liquids, and apparatus employed therein.—D. Imhof. Authomatic musical instruments.—E. Lee. Mode of producing designs or patterns on surfaces by the aid of stencil plates.—S. Nield and B. Foster. Manufacture of prussiate of potash and prussiate of soda, and means employed for collecting and ultizing the gases and other substances emitted in the mannfacture thereof.

On July 28th.—2625 to 2610. — T. Slater. Electro-magnets and batteries, or apparatus to be employed therewith.—R. H. Taylor. Apparatus for heating air, and application of the same to drying, boiling, and other purposes.—J. Nall, G. Goldsmith, and J. Dilkes. Types for printing and for the production of name and other similar show-plates.—T. Welton. Apparatus for generating and applying electricity for therapeutic purposes.—E. G. Brewer. Clasps for corsets, corselets, or stays (com.) (Complete specification.)—H. Pain. Kitchen ranges.—A. Budenberg. Illuminated pressure and vacuum gauges (com.)—W. D. Bowness and J. Judge. Apparatus for generating and purifying gas for illuminating and other purposes.—W. Tinker. Apparatus for testing the quality of milk, extracts, pigments, powders, and other matters (com.)—E. D. Pape. Vaginal speculum.—R. Martin. Apparatus for clipping or shearing animals. — L. Fromage. Braces. — G. K. Winter. Electrical intercommunication in trains.—M. Glover. Machinery for cutting wood and other substances.—J. H. Johnson. Manufacture of soda and potash (com.)—G. Haseltine. Faucets (com.) (Complete specification.)

On July 29th.—2641 to 2650.—S. Davey and J. Watson. Cartridges of compressed gunpowder, and machinery for compressing the same; some of which are applicable to ordinary gunpowder in grain, and to other explosive compounds.—H. W. C. Tweddle. Manufacture of paraffine and illuminating and lubricating oils from petroleum.—B. Hunt. Construction of railway breaks (com.)—R. M. Sandys. Construction of boots and shoes.—W. Hillam. Machinery and apparatus for tying up corn or other cereals into sheaves or bundles.—J. H. Johnson. Apparatus for transmitting musical tones by electricity (com.) (Complete specification.)—R. S. Daville. Sewing machines (com.) (Complete specification.) — A. M. Clark. Electro-magnetic governors for steam heating and drying apparatus (com.)—G. N. Torrence. Mattresses.—W. L. Wise. Lamps for burning petroleum and other mineral oils (com.) (Complete specification )

On July 30th.—2651 to 2661.—J. Badcock. Dyeing of linen threads and cottons and the use thereof for figuring or devicing fabrics.—R. Daglish and G. H. Daglish. Treatment of certain materials used in grinding, smoothing, and polishing glass, and apparatus employed in the said treatment. — N. Fellows. Scent fountain.—W. Broughton. Coating or covering steam-boilers, steam-pipes, steam-economizers, superheaters, and other heated surfaces to prevent the radiation of heat therefrom. —F. C. Coxhead. Apparatus for opening and closing or moving doors in the bulkheads and other parts of ships or vessels.—A. Durande. Typography for the reproduction of designs for decorating purposes. —J. Higham. Steam and other engines.—T. Dickins, A. L. Dickins, and H. Heywood. Machinery or apparatus used in dyeing yarns or threads of silk.—R. K. Boyle. Electric telegraph apparatus.—J. F. Clarke. Apparatus for distributing water in public thoroughfares. —E. T. Budden. Belts for carrying cartridges, military, sporting, and other travelling articles.

On July 31st.—2662 to 2672.—W. Passmore. Conducting the water from the rim of umbrellas. —J. E. F. Ludeke. Construction of turbines, applicable to various useful purposes.—C. Eskrett. Apparatus employed in the manufacture of seed or oil cakes.—A. Brehmer. Couplings for shafting, and hubs for wheels, pulleys, and cranks.—R. F. Mushet. Method of raising water and other fluids, and construction and arrangement of apparatus for that purpose. —A. G. Brookes. Copying presses, a part of which is also applicable to stamping and punching machines (com.)—A. Stokes and F. J. Stokes. Manufacture of certain kinds of nails, bolts, pins, screws, rivets, and other like articles, and in machinery to be used in the said manufacture.—R. J. Jones. Operations and machinery for seasoning, marking, and cutting wood.—H. J. Maquet. Construction of hand or guard-railings, as applicable to railway trains.—R. Whitaker and A. Holden. Manufacture of measuring tapes, and their application to writing pencils, walking sticks, and other similar articles.—J. H. Cohrs. Railway couplings.

On August 1st.—2673 to 2686.—J. S. Levett. Safety apparatus for the purpose of instruction in the art of swimming.—J. Bernays. Steam and other engines and reciprocating machinery, having reference more particularly to the connection of the reciprocating to their rotating parts. —S. G. Browne and A. Moore. Pipe wrenches. —J. A. Manning. Apparatus for receiving and treating human excretæ, and the composition of the disinfecting and deodorising powder used therein.—H. Schildberg. Writing desks and tables.—L. F. Gosselin. Buoy for saving gold, bank notes, bills, and other precious articles.—L. F. Gosselin. Jacket or waistcoat for swimming and saving life.—F. Wirth. Portable watchman's-time-detectors (com.)—W. R. Lake. Machine for hanging wall paper (com.) —P. Whiteside. Improved clothes wringer (com.)—B. Harlow. Boilers of hot water heating apparatus, applicable also to the generation of steam.—T. R. Oswald, A. Oswald, W. R. Oswald, and F. R. Weyergang. Steam boilers and setting the same.—J. Key. Additions to boats.—H. H. Murdoch. Treatment of leather called "sole leather," for the purpose of hardening it and rendering it impervious to water (com.)

On August 3rd.—2687 to 2690.—W. Davies. Obtaining motive power particularly applicable for working pumps on board ships.—T. W. Dowler and J. Smith. Fastenings for solitaires, sleeve

(*To be continued on page* 163)

**SCIENTIFIC REVIEW**
AND
**Scientific and Literary Review,**
A RECORD OF PROGRESS IN
ARTS, INDUSTRY, AND MANUFACTURES,
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NOVEMBER 1, 1874.

## PROGRESS OF TECHNICAL EDUCATION.

Technical education is gradually assuming the position of one of the questions demanding Governmental action; indeed, it would appear that the only reason why the matter has not already been brought before Parliament by the Government is, that the present arrangements of the Science and Art Department at South Kensington are considered to be sufficient to meet the requirements of the case.—Our rulers, following their usual course when any questions as to the intellectual wants of the people are concerned, do as little as they possibly can.

However, notwithstanding this supineness on the part of the Government, technical education has received much attention from various public bodies; amongst others, the London School Board, which has been urged by Mr. Lucraft and Mr. G. Potter to give attention to the teaching of drawing as applicable to technical requirements; and some of the City Guilds have continued their well meant efforts with some little success.

But the most hopeful sign of progress is to be found in the fact that the classes for whom a good system of technological teaching is desiderated—the working people—are, themselves, coming forward to push on the movement for a thorough and national system of technical education, available for working men's children; which it is intended shall take the place of much of that demi-semi classical sectarian education on which a great portion of our splendid endowments has been, and even now is being, wasted.

The Labour Representation League, a body almost wholly composed of working men, have recently been engaging themselves in what intelligent people of all parties must approve of, namely, the endeavour to promote the establishment of a sound system of National Technical Education, embracing a central and local university, and provision for technical education in the curricula of endowed grammar and secondary schools, School Boards being solicited to adopt in all primary schools under the Act of 1870 a system of elementary education in accord with the requirements of trades in the districts resided in by the scholars.

The scheme in question is not altogether new to our readers, as we formerly presented them with some similar suggestions made by a committee of working men,—many of whom are engaged in the present movement—it contemplates that, according to specialwants, workshops, laboraties, and other requisite appliances for operations and experiments be provided.

And that all professorships, lectureships, or offices of emolument should be the reward of merit only, and bestowed upon artizans in so far as practicable.

That a staff of popular lecturers, members of the National Trades' University, should be appointed for the purpose of instructing the adult population in scientific and technical information.

That mechanics' institutions, athenæums, and other public educational buildings should be, as far as possible, utilised for lectures and so forth.

The funds suggested for the support of these institutions are proposed to be obtained thus—

1. Technical masters of primary schools, the secondary schools and local universities, by district educational endowments and Government educational grants.

2. A National University, by Government educational votes; and they also suggest, considering the original intention in forming the City Guilds and analogous bodies, that they might be reasonably asked to contribute to the maintenance of the same.

Such is the basis of principles, plan, and action this body conceives should now be enforced, and this basis appears to be fully justified by the fact that the reports of the various commissions make it plain that for long years in the past these educational charities have, to put it in the mildest form, been grievously maladministered. The little reformation by the legislation of 1869, meagre as it was, the Government has now stayed.

Under these altered circumstances nothing can effectually satisfy the case short of fresh legislation, altogether abolishing the commission and plans inaugurated in 1869, so as to ensure through the help of these endowments the cause of education being thoroughly accomplished, by establishing in their place other powers with the broader capabilities now requested.

To facilitate this work the League, in order to awaken the public interest, intends agitating the subject, and drawing the attention of the people to the nature and intent of the schemes practised upon them at their cost and loss, so that they may be aroused to insisting upon Parliament no longer allowing these charities to remain neglected, or, what is worse, wofully abused, but rather to ensure their better application in fostering that technical education, which will more than all else conduce to maintaining England's highest honour and defence, by still conserving her commercial superiority amongt nations; and although we think some slight emendations might be made in the plan proposed, and would counsel that no endowment should be carried away from the founder's expressed intentions, where they are legal and capable of being fulfilled, yet we think that those endowments which are not amenable to these considerations are quite sufficient for the purpose, and such could not be more properly dealt with.

For ourselves we do not consider the capital of the technical education column should be a university, but a central technological academy, placed in all respects on a footing with the Royal Academy, with local branches or divisions. This suggestion being based on no fanciful preference for a name, but because we deem it absolutely necessary to make patent to all that these institutions contemplate the promotion of something beyond mere book-learning, moreover we consider Royal Technological Academician, or Associate that is, R.T.A. and A.R.T.A. will suit practical men better than the title of Doctor of or Professor.

## Reviews.

### MAGNETISM.

"A Treatise on Magnetism, General and Terrestrial." By HUMPHREY LLOYD, D.D., D.C.L., Provost of Trinity College, Dublin, formerly Professor of Natural Philosophy in the University. London: Longmans, Green, and Co. 1874.

WE cannot give our readers a better idea of this work than is afforded by the author in his preface, where he states that the present volume is a fragment of a work projected and partly completed many years ago, which was intended to embrace the various branches of physical science usually comprehended in the *Traitès de Physique* of French writers. In the long interval which has elapsed since its commencement, the sciences of heat and electricity have been fully treated by English writers, their selection being in great measure due to their connexion with chemistry; while those of light, sound, and magnetism have not received the attention, here or elsewhere, which their intrinsic importance demands. The author has already endeavoured to supply in some degree this want, by the publication of a volume on the wave theory of light; and he now seeks to satisfy it more fully by the production of a treatise introductory to the science of terrestrial magnetism.

The researches connected with this science may be classed under two heads—namely, first, the determination of the elements of the earth's magnetic force at several points of the earth's surface, and the laws of their changes of magnitude with change of place; and, secondly, the variations of the elements themselves at a given place dependent upon time.

The methods employed in recent years in the first inquiry owe their present perfection to the labours of Gauss and Weber, and those who have followed in their footsteps; they will be found explained in the sixth chapter of the present volume. In the scientific coordination of the results our sole guide is Gauss's beautiful memoir on "The General Theory of Terrestrial Magnetism."

The instrumental means employed in the determination of the variations of terrestrial magnetism, described in the present volume, are those of the Dublin Magnetical Observatory. They were devised by the author, when that Observatory was founded and placed under his superintendence by the governing body of Trinity College in 1838. They are based, in part, upon the principles of the Gottingen instruments, and are partly new in principle as well as in detail. These instruments were adopted at all the British Colonial observatories, as well as at most of the foreign magnetical observatories which took part in the magnetical co-operation inaugurated by the Royal Society in 1840; and they are thus invested with an historical interest which will justify the space given to their description and adjustments in the present volume. And it is to be observed, that the theoretical principles involved in their construction and use remain unaltered, however the instruments themselves may hereafter be modified in detail. It is hoped, therefore, that this portion of the present work may be found of service to those who shall hereafter be engaged in similar observations.

The account which the author has given of the principal results obtained in recent years in connexion with the variations of terrestrial magnetism, will, he trusts, serve the same purpose; while, at the same time, it presents the general scientific reader with a condensed summary of the leading facts of the science. As it would have been impossible to give in a moderate compass the numerical representation of the laws deduced at all the co operating observatories, the course pursued has been to present the results obtained at a single station, at which all the general features of the phenomena belonging to the middle northern latitudes were fully developed, and to supplement the information by the results of observation at places widely removed from the former in geographical position, as well as in their relation to the sun's daily and yearly courses. The single station selected for this purpose is Dublin, partly because it fulfils the condition above described, and partly, also, because the reductions have been there made according to methods which appear to the author himself to be the most suitable.

The author has not entered upon the interesting speculation connected with the physical causes of the phenomena, further than to reprint a paper, published by himself many years ago, in which the agency of the sun and moon are shown not to be due to their direct operation as magnetic bodies. Notwithstanding the speculations of Lamont, Secchi, de la Rive, and others on this subject, the mode of agency of these bodies has not been established; and until this key be found, the subject must remain within the misty region of conjecture. The author will only here observe, that the electrical earth-currents, the existence of which is not confined (as was at first supposed) to days of abnormal change, must have their effect upon the magnetical variations recorded in our observatories, whether they be the sole or only a co-operating cause.

The work contains chapters on general phenomena; processes of magnetization; coercitive force; effects of temperature on magnets; measurement of free magnetism in magnets; laws of magnetic distribution; laws of magnetic attraction and repulsion; magnetism of all bodies; terrestrial magnetism; direction and intensity of the earth's magnetic force; direction and intensity of the terrestrial magnetic force at different points of the globe; magnetic variations; instruments and method of observation; magnetic variations of long period; annual inequality; diurnal inequality; lunar inequality; magnetic disturbances; and an appendix referring to general theory of the dipping needle; general theory of terrestrial magnetism; effects of the variations of the humidity of the air upon the position of a magnet suspended by silken fibres; diurnal inequality of the horizontal components of the magnetic force at various stations, and on the direct magnetic effect of a distant luminary upon the diurnal variations of the magnetic force at the earth's surface.

As a specimen of the character of the work we present the following statements on the subject of the magnetism of all bodies:—

The great discovery of the magnetism of all bodies was made by Faraday, in the year 1845. Employing a method of research not unlike that of Coulomb, Faraday has shown that all bodies, whether solid, liquid, or gaseous, are acted on by the poles of a magnet, and are consequently magnetic, some of them being attracted by the magnet, while others are repelled.

In reference to these properties, therefore, all natural substances are divisible into two classes. Those which are attracted by the poles of a magnet are called by Faraday paramagnetic; and their magnetic properties are similar to those which had been already recognised in iron, nickel, and cobalt. Substances which are repelled by the poles of a magnet are denominated diamagnetic; and they constitute a much more numerous class than the former. As iron is the type of paramagnetic substances, so bismuth may be taken as that of the diamagnetic, inasmuch as it possesses the property of diamagnetism in the highest degree. (This property of bismuth was noticed in the last century. In 1774, Brugmanns observed that a bar of bismuth repelled the magnetic needle; and the same property was noticed in antimony, as well as in bismuth, by M. Lebaillif, in 1829. Indications of an analogous property were also noticed in unmetallic substances, such as wood, gum-lac, &c., by M. Becquerel. These bodies seemed to be acted on by the poles of a magnet, some of them assuming a transversal position between the two opposite poles.)

In these researches Faraday made use of the electro-magnet, on account of its great power. It has been constructed by M. Rumkorff in the following form, with a special view to such experiments. Two cylinders of soft iron are surrounded each with a long coil of copper wire, and are fixed with their axes in the same right line. When the current from a battery is transmitted through the coils, the iron cylinders become powerful magnets. By means of a commutator introduced into the circuit, the circuit may be closed or interrupted, and the direction of the current changed at pleasure; and thus the magnetism of the two poles may be inverted or destroyed. In order to vary at pleasure the interval of the acting poles, these cylinders are attached at their remote extremities to two upright pieces of soft iron, which slide in a horizontal grove, formed in a support of the same metal. A horizontal rule, attached to this support, enables the observer to adjust the interval of the acting poles. The apparatus is provided with pieces of soft iron of various forms, which can be screwed on the acting ends of the two iron bars, so as to vary the extent and form of the polar surfaces. When it is required that the magnetic forces shall act with nearly equal intensity throughout a considerable space, we employ circular discs of large diameter as armatures, the magnetic field, as it is called, being in such circumstances considerable. On the other hand, when we desire to concentrate the forces emanating from the two poles, we employ as armatures cones with rounded extremities.

The polar surfaces being concentrated by the means last described, the substance to be examined is formed into a light needle, and suspended horizontally by a fibre of silk without torsion, so that its centre shall be at the middle point of the line connecting the two poles. When the circuit is completed, the cylinders of soft iron become magnetic; the suspended needle is deflected, and takes up a definite position under the action of the inducing forces. This position coincides with the line connecting the two poles, when the needle is attracted, *i e.*, when the substance of which it is composed is paramagnetic. On the other hand, the position of equilibrium is at right angles to the line connecting the poles when the needle is repelled, or the substance of which it is composed diamagnetic. The former position is denominated axial; the latter equatorial.

If the needle be disturbed from its position of equilibrium, whether it be axial or equatorial, it will always return to that position, which is accordingly one of stable equilibrium.

By the means above described Faraday ascertained that all solid bodies examined were magnetic. Some of them are attracted by the poles of the magnet, and assume the axial position between the two poles; others, forming a much more numerous class, are repelled, and assume the equatorial position. The following is the order of the principal metals belonging to the two classes, each substance being more powerfully magnetic than those with succeed it in the list:—Paramagnetic metals, iron, nickel, cobalt, manganese, chrome, cerium, titanium, palladium, platina, osmium; diamagnetic metals, bismuth, antimony, zinc, tin, cadium, sodium, mercury, lead, silver, copper, gold, arsenic, uranium (according to the more recent observations of M. Verdet, uranium is paramagnetic), rhodium iridium, tungsten.

The position of equilibrium of the needle between the opposite poles of two magnets is, however, not the fundamental fact by which the two classes of magnetic bodies are to be discriminated. The axial direction is in general the result of attraction, exerted by the pole of the magnet upon the paramagnetic body; and the equatorial direction of repulsion. Oerstead and others have shown, however, that these results are not invariable; and that the same body may at one time assume the axial, and at another the equatorial direction, according to its position in the magnetic field and other circumstances. The two classes of magnetic bodies are therefore to be distinguished, not by the directions which they assume, which is a complex result, but by their tendency to or from the centre of force; paramagnetic bodies being urged towards those points in which the intensity of the magnetic action is greatest, and diamagnetic bodies towards those points in which the intensity is least.

But even attraction and repulsion themselves are not ultimate facts. We have already seen that when a piece of soft iron is brought into the vicinity of a magnetic pole, the attraction which ensues is a consequence of a polar change induced in the iron by the acting pole, a pole of the opposite kind to that of the acting body being engendered in the near portion of the mass, and a pole of the same kind in the remote portion. Hence, as similar poles repel one another, while contrary poles attract, attraction will ensue between the inducing pole and the near portion of the iron, and repulsion between the same and the remote portion, and the resulting action will be the difference of these opposing forces. It is evident that it must be attractive, the attraction being exerted at the shorter distance. The same explanation of course applies to the attraction of all paramagnetic bodies.

We are led by analogy to infer that the repulsion exerted by a magnetic pole upon a diamagnetic body is, in like manner, to be explained by a polar change induced in the body by the acting force. But the polarity induced in this case is necessarily different from the former. As the repulsive force predominates, we must assume that a similar pole is induced in the near portion of the diamagnetic, and a contrary pole in the remote portion. This view, however, has not been admitted without much discussion. Professor Weber has adduced the following experiment in confirmation of it. A coil was fixed to the polar surface of an electro-magnet, the axis of the coil being in the prolongation of the axis of the magnet; and the ends of the coil were connected with the poles of a delicate galvanometer. When a cylinder of bismuth was introduced into the coil, it was rendered magnetic by the induction of the electro-magnet; and at the same moment an induced current was transmitted through the coil, which deflected the needle of the galvanometer. An opposite current was induced in the coil when the bismuth cylinder was removed. M. Weber found that these currents were the opposite of those which would be produced by a cylinder or soft iron under the same circumstances; and he concluded therefore that the bismuth cylinder had been rendered polar by the inducing action of the electro-magnet, the polarity being the inverse of that engendered in soft iron.

This view of the phenomenon has now been completely established by the experiments of Professor Tyndall. The apparatus employed by Professor Tyndall was one devised by Professor Weber. The substance to be examined was formed into a cylinder, and was acted on by the induction of a coil through which a voltaic current was transmitted; and the polarity of the end of the bar was examined by allowing it to act upon a compound magnetic needle, which was rendered astatic, or indifferent to the action of the Earth. In order to increase the effect, two cylinders and two helices were employed; and the corresponding poles were made to conspire in deflecting the needle. By an ingenious mechanical arrangement, either pair of poles could be brought rapidly into action upon the needle; and the direction of the deflection was read off by means of a telescope, and a mirror attached to the needle, which reflected the divisions of a distant scale. Professor Tyndall experimented by these means on a great variety of substances, both paramagnetic and diamagnetic; and he ascertained that the latter were polarized, as well as the former, under the inducing action of an electric current; but that the positions of the poles induced in paramagnetic and in diamagnetic bodies, by the action of the same current, were contrary.

We may conclude therefore—

1. That all bodies are polarized under the action of a magnetic force.

2. That in soft iron, and other paramagnetic bodies, the pole induced in the side next the inducing pole is of a contrary kind; and that, consequently, the body is attracted.

3. That is bismuth, and other diamagnetic bodies, the pole induced on the near side is of the same nature as the inducing pole; and that, therefore, the body is repelled.

Fluids, whether liquid or gaseous, are acted on by magnetic forces just as solids, some of them being paramagnetic, and attracted to the centre of force, while others are diamagnetic, and are repelled.

The magnetic properties of liquid were discovered by Faraday by means similar to those applied to solid bodies. The liquid to be examined was inclosed in a thin tube of glass, and suspended by a silk thread between the opposite poles of a strong electro-magnet. Some liquids were thus found to take the axial position, and are consequently paramagnetic; while others rested only in the equatorial position, and are therefore diamagnetic. When these liquids are inclosed in thin spheres of glass, and are exposed to the action of a single pole, those of the former class are attracted, and those of the latter repelled.

The same method was also applied by Faraday to the investigation of the magnetic properties of gases. The gases examined were inclosed in thin spheres of glass, and these spheres were attached to the extremities of a horizontal lever supported by a fibre of silk; by these means the slightest action exerted upon them by the acting magnetic pole could be rendered sensible. Oxygen was thus found to be strongly paramagnetic; carbonic acid gas, olefiant gas, and cyanogen are diamagnetic. Hydrogen and nitrogen are very feebly acted on. Atmospheric air itself is paramagnetic; but it probably owes this property to the oxygen which it contains, its other principal constituent being nearly neutral.

M. E. Becquerel has measured the magnetism developed in various gases, and under different circumstances, and has concluded from his experiments that in the same gas, and under the inducing action of the same pole, the magnetism developed is proportional to the density.

Since the fluids by which bodies are encompassed are acted on by the magnetic force, as well as the bodies immersed in them, it follows that the attraction and repulsion which are exerted on the latter are apparent only, and equal to the excess of the action exerted on an immersed body, and on an equal volume of the fluid which it displaces. For when the immersed body is removed, the portion of the fluid which occupies its place—being at rest relatively to the remainder—is acted on by the pressure of the surrounding fluid with a force equal and opposite to that by which it is urged by the magnetic pole; and it is evident that the body, which occupies the same place, must undergo an equal negative action. The case, in fact, is analogous to that of heavy bodies immersed in fluids, and acted on by gravity; in which case we know that the resultant action is the excess of the weight of the body over that of the displaced fluid.

It follows from these considerations that the same body may be either attracted or repelled by the same magnetic pole, according to the nature of the fluid in which it is immersed. This fact wrs discovered by Faraday at an early period of his investigations. A dilute solution of protosulphate of iron was inclosed in a thin tube of class, and suspended horizontally between the poles of an electro-magnet. The liquid being paramagnetic, the tube immediately assumed the axial position. The same thing occurred when the tube was immersed in water instead of air; and the resulting action was even stronger. When, however, the tube was immersed in a solution of the protosulphate, of the same strength as that contained in the tube itself, it was found to be indifferent to the action of the magnetic pole, and to rest in any position in which it was placed. And when the surrounding solution was more concentrated, the liquid contained in the tube was repelled, and the tube rested in the equatorial position.

In order to understand clearly these various effects, let $\mu f$ denote the force exerted by the magnetic pole upon any body immersed in a fluid, and $\mu' f$ that exerted by the same pole upon the fluid displaced. These forces are in contrary directions, and are applied to the same points of the immersed body; consequently the resultant force exerted upon the latter is

$$(\mu - \mu')f.$$

Hence, when the body immersed, and the encompassing fluid, are both paramagnetic, $\mu$ and $\mu'$ are both positive; and accordingly the resultant action will be positive or negative, and the body will be attracted or repelled, according as $\mu$ is greater or less than $\mu'$. When $\mu'$ is equal to $\mu$, the resultant vanishes, and the body is indifferent to the action of the magnetic force, or neutral.

When the body, and the fluid in which it is immersed, are both diamagnetic, $\mu$ and $\mu'$ are both negative; the formula becomes

$$-(\mu - \mu')f.$$

and the body will be repelled or attracted, according as $\mu$ is greater or less than $\mu'$.

When the body immersed is paramagnetic, and the fluid diamagnetic, $\mu'$ is negative, and the formula becomes

$$(\mu + \mu')f.$$

Thus the resultant action is always attractive, and more energetic than if the body were *in vacuo*. When, on the other hand, the body is diamagnetic, and the fluid paramagnetic, $\mu$ is negative, and the formula becomes

$$-(\mu + \mu')f.$$

The resultant action is therefore always repulsive, and more energetic than that exerted upon the body alone.

The specific magnetic powers of different substances were compared by M. E. Bacquerel by means of the balance of torsion. When the bodies to be tried were solid, they were formed into needles of the same form and dimensions, and were suspended between the poles of a strong electro-magnet, by means of a fine silver wire. The forces of attraction or repulsion exerted upon them were then measured by the angles of torsion, which it was necessary to communicate to the wire in order to maintain the needles at a constant angular distance from the line connecting the acting poles. The magnetic forces thus measured are the magnetic powers *in air—i.e.* the differences of the absolute powers of the bodies experimented on, and that of the air by which they were encompassed. M. Becquerel concluded from his experiments that soft iron, nickel, and cobalt had all the same specific magnetism. The specific magnetism of manganese was found to be such as would result from the presence of the 1-1,000th part of its weight of iron: that of gold is equivalent to a mixture of the 1-114,000th part of iron.

The magnetic powers of liquids were found by measuring the resultant action exerted by the magnetic pole upon the same solid when immersed in different liquids. The force of the solid in air being known, the powers of the liquids are readily calculated from the formula

$$(\mu - \mu')f = p\,(\theta - a);$$

$\theta$ being the angle of torsion which produces a given deflection, $a$; and $p$ a constant depending on the distance and upon the suspension wire. The quantity, $f$, is proportional to the square of the intensity of the current which traverses the coils. The same method is applicable to the gases.

It will be seen that although the work is a readable, we might say elegant, one, it is profoundly scientific, and we commend it to our readers.

### TYER'S PATENT TRAIN SIGNALLING TELEGRAPHS.

"Tyer's Block Telegraph and Electric Locking Signals." Tyer and Co., 4, Old-street, Finsbury.

THE application of electricity (say Messrs. Tyer) for the purpose of signalling trains on railways is so well known, that it is unnecessary here to enter into any inquiry as to its origin and progress, except so far as to illustrate and explain this particular system.

So soon as the electric telegraph was brought into practical operation for commercial purposes, railway managers and engineers were prompt to utilise it as an efficient and powerful auxiliary for the speedy and secure working of their traffic upon such portions of their lines as required more than ordinary precaution.

Mr. Cook, one of the earliest inventors of the electric telegraph, several years since designed and introduced on the Eastern Counties Line, between Norwich and Yarmouth, a very complete system, especially suited for train signalling by telegraph; but from the number of wires required, the great cost, and other circumstances, it did not come into general use. Mr. Edwin Clark subsequently modified Mr. Cook's method, and introduced on the North-Western Railway that mode of signalling known as "the block system," signifying the "maintenance of an interval of space between two following trains travelling on the same line." With a view to remove some of the defects in the apparatus employed for carrying out these arrangements, and to diminish the general cost, the instruments known by the name of "Tyer's Train Signalling Telegraphs" (employing only one line wire) were designed in 1851, and by the introduction of several important improvements that have from time to time suggested themselves during their long course of practical working, they have attained their present efficiency.

Our first patent, granted 22nd January, 1852, was for a block telegraph instrument having two indicators, combined with a treadle, worked automatically; so that as each wheel of a passing train depressed it, the electrical indication of the approach of such train was transmitted to the station in advance, where the train upon its arrival, by similar means, transmitted the "line clear" signal to the station in the rear.

This patent was also for an electrical apparatus for communicating from a station to the driver of an engine, whilst running at full speed between two stations.

These instruments and apparatus were first put to work on the Brighton Railway, and the automatic portion on sections of the South-Eastern Railway. Captain Barlow, the then superintendent, and afterwards general manager of this railway, wrote thus respecting them :—

"24th January, 1854.

"With regard to their principle, I am of opinion that by doing away with the treadle, and so arranging them that the signalman at each station shall have the power of giving the signal by hand, you will have effected the most valuable method of signalling trains which has yet been brought forward, and one which will give the officers in charge of stations a confidence in the working of the railway hitherto not attained by needle instruments.

"(Signed) R. H. BARLOW."

Our second patent, granted 10th January, 1854, was for various improvements in the details of the block apparatus, more particularly for working the instruments by hand, so "that the mere depression of the piston rod by the hand or thumb of the signalman in charge would operate upon the distant instruments, and the necessary signal would be given from one part of the railway to another part."

It also comprised a lock and key commutator, so designed that both signalmen had to be present to effect a complete interchange of signals. It further embodied arrangements for employing magneto electricity for working the apparatus in place of galvanic batteries.

Our third patent, granted 21st December, 1855, was for further improvements in the indicating as well as the transmitting portions of the block telegraph apparatus; also for the guard and driver apparatus, for "communicating between the different parts of a railway train by magneto electricity."

Our fourth patent, granted 29th Nov., 1861, was for step by step alphabetical telegraphs, also for transmitting keys, and for a mercurial battery.

Our fifth patent, granted 6th January, 1865, was for a modification of the step by step telegraph, necessitating the manipulation and concurrences of both signalmen to send and receive the required signal or suite of signals.

Also for an apparatus for enabling the guard of a train to communicate to the stations on either side of him, in the event of a break-down of a train in a tunnel.

Also for an apparatus, constructed for the last vehicle of a train, to signal automatically to the station in the rear, that all the carriages comprising such train had safely passed clear through a tunnel or junction, &c.

Our sixth patent, granted 6th October, 1869, introduced the system of re-magnetising the magnets employed for inducing the requisite polarity of the indices, thereby immediately counteracting the effects of lightning, &c., as hereafter described in detail.

This patent also includes the electro-magnetic apparatus for locking and interlocking signals, points, and levers at and between stations, so that a signalman may be assured, before starting a train, that all the signals, points, and levers at the distant station are in their proper positions for the safe reception of such approaching train. The signalman at the distant station may also be equally confident, not only that the signals at the station in the rear have been properly raised behind such train for its due protection, but that they cannot be inadvertently lowered by the signalman in the rear to authorise the departure of a following train, inasmuch as they are securely "locked" by the signalman in advance until he transmits the "line clear" signal upon the arrival of the first train.

Our seventh patent, of 1873, introduced the system of completely isolating the indicating portions of the block telegraph apparatus except at the moment of the concurrent action of both signalmen sending and receiving a signal, thereby securing the important desideratum of perfect immunity from lightning, aurora borealis, line contacts, earth currents, &c.

The object of our patent of 1869 is to immediately rectify, automatically, the effects of lightning, &c., by re-magnetization, and the practical results have proved eminently successful. The object of our patent of 1873 is to prevent the entrance of lightning entirely.

This patent also includes an arrangement for communicating electrically between a passenger and guard and guard and driver during the transit of a train, and in such manner that, after a short and regulated interval of time, the communication is re-established automatically, while evidence is recorded at the compartment from whence the "call" emanated.

In referring to some of the defects alluded to as existing in the earlier block system, it will be sufficient to remark that the exterior needle on the dial is moved by a small magnet placed within and surrounded by coils of wire, and is deflected either to the right or left by currents of electricity generated from an ordinary galvanic battery, and constantly circulating through these coils; but a small change of atmospheric electricity or lightning entering them either reverses the polarity of the magnet or destroys its magnetism This defect is often a source of great danger, for if the polarity of the magnet be reversed the indicator is likewise reversed, and may show "line clear" at one station, whilst at the other station the indicator is still exhibiting the correct signal, "train on line," or *vice versâ*. Again, if the magnet be demagnetized the signal "line blocked" may be given although the line may be actually clear, and will remain so until the regular inspector arrives to take the instrument to pieces, in order to reinstate the magnets to their proper polarity and ordinary standard of magnetism. The coils, also, being usually wound with very fine wire, are often destroyed by comparatively feeble charges of lightning.

Recently several attempts have been made to neutralise this reversal of signals from lightning by introducing into the instruments large permanent magnets, and therefrom inducing sufficient magnetism into the smaller magnets to actuate the indicator; but severe storms have shown the fallacy of trusting to any permanent magnet to overcome the effects of lightning, inasmuch as however large this permanent magnet may be made to gain power, the force of the lightning is still greater; and when lightning protectors of extremely fine wire are employed in addition these become fused, and the instrument remains useless by the communication being thus stopped until proper means are taken to repair the damage.

Three line wires are also required, and five sets of batteries, with persistent currents, thereby entailing the continuous consumption of the battery power to exhibit the required signal.

In Tyer's improved instruments, however, no permanent magnets are employed. The exterior indicator on the dial is moved by a piece of steel suspended near to one of the poles of an electro-magnet, and this electro-magnet, being in direct communication with the battery, is rendered powerfully magnetic during the transmission of each signal, thereby causing the piece of suspended steel to become likewise magnetic. So soon as the current ceases to flow the electro-magnet parts with the greater portion of its magnetism, while the steel retaining it is thus enabled to maintain the required deflection, precisely as if it were held over at the expense of a persistent battery current.

There is also in combination with this arrangement, and equally efficient, an electro-magnet fitted with "horns" or "keepers" of peculiar construction, so arranged as to concentrate and retain for an indefinite period the residual magnetism produced on the passage of every signal, thus rendering such magnetism, as it were, permanently available, in addition to maintaining the piece of steel to a required deflection. Furthermore, the coils of thick wire surrounding this electro-magnet, when traversed by suitable transitory currents of electricity, cause the indicator to be deflected to the signal required. By the foregoing arrangements the indicator on the dial cannot be made to deviate from its proper signal, for even if the signalman could possibly tamper with his instrument, and, in the event of an accident, endeavour to shift the blame on the distant signalman by in any way altering his signals, say from "train on line" to "line clear," yet the indicator would immediately right itself under any circumstances, and give the correct signal as last sent.

No special electro-mechanical locking apparatus is required (as in some arrangements of train telegraphs) in order to prevent the indicators shifting their position through the vibration caused by passing trains, or by the magnets becoming weakened. Thus the dangerous element of uncertainty in all electro-mechanical locking gear (locking the indicator to the reverse or wrong signal) is removed.

Any advantages possessed by a system employing permanent electric currents are fully realised in Tyer's system by this arrangement, and yet without the disadvantages of an everlasting expenditure of battery power, or the additional cost of erecting and maintaining three line wires instead of one.

The coils of the electro-magnets, being wound with wires of considerable sectional area, allow ordinary charges of lightning to pass freely to "earth" without injury to the instrument; and the principal feature in the construction of the apparatus is to rectify any interruption that may have occurred through lightning, immediately the first current is transmitted at the commencement of the "call" instituted for this purpose, and without any other extraneous assistance the indicators will forthwith resume the position of the last signal sent.

In addition, lightning conductors, constructed with double rows of serrated teeth, are now fitted to each instrument, so as to intercept and divert the more powerful charges of atmospheric electricity direct to "earth," yet in such a manner as to leave the instrument in circuit and in proper order for continued communication. The indicators are arranged not to require the usual constant mechanical adjustments depending upon the varying strength of the battery power.

Separate "ringing keys" are employed for all "call signals," thereby avoiding the possibility of error through unnecessarily using the "plungers" of the instrument, or through the signalman having to select the particular plunger according to the last signal sent.

One line wire only is required. This serves for signalling both the up and down trains on a double line of rails, and in each direction from a signal-box.

In fitting up signal-boxes with the ordinary needle block system it is usual to employ four single needle instruments and one bell, requiring five complete sets of batteries; whereas in Tyer's block telegraph two instruments only are required, and one set of batteries.

Apart from the present self-rectifying principle now introduced into these block telegraphs, and apart from the prestige awarded to them by the patronage of the important railway companies who have for a lenghtened period tested and adopted them, it is to be observed that it is practically impossible for lightning to be productive of any danger in the working of single wire block telegraphs, because the atmospheric electric current must not only produce the correct visual as well as its accurate accompanying audible signal requiring to be sent from one station, but it must of necessity give the exact code reply for the receipt of such signal from the distant station. Besides, one signalman must act upon the presumption that he had sent the atmospheric interruption for which the received reply was the acknowledgment, and he must still further omit to register such reply in his train signal book, otherwise the blank space, by non-entry of the atmospheric interruption, would at once convince him he had never forwarded such partial signal. Furthermore, a second train would have to be properly signalled and acknowledged, and in addition to such a combination of faults on the part of the two signalmen this second train would have to overtake the first, through the inattention of the driver, before the protection from accidents afforded by block signalling could be found of no avail.

In the case of ordinary three wire persistent-current instruments, on the contrary, when lightning has reversed them, it has invariably caused them to exhibit "line clear" at one station, while "train on line" was being signalled from the distant station, or *vice versâ*, and through the continuous flowing of the battery current the instruments are caused to permanently exhibit false signals until rectified by a qualified person.

From the foregoing it will be obvious that Tyer's single wire ordinary block telegraph possesses an immunity from lightning distinguishing it from other block signalling instruments.

Since Mr. Cook's, Mr. Clark's, and Mr. Tyer's block telegraphs were first designed and worked a number of ingenious contrivances have from time to time been introduced to the notice of the railway world, generally based more or less on the previous original ideas; and although they claim some intrinsic merits, they have not met with that general success and adoption that has been accorded to Tyer's instruments. These intruments, notwithstanding the strenuous opposition of various parties, have not only maintained their position, but are yearly gaining increasing favour, from the unqualified satisfaction they have given to general managers who have adopted and are at present using this system in preference to, and in some cases to the displacement of, other systems previously at work, either upon the whole or on special sections of their lines.

## ARTISTS' EDITION OF "ARLON GRANGE."

"Arlon Grange and a Christmas Legend." By William Alfred Gibbs, author of the "Story of a Life," "Harold Erle," &c., &c. Artists' Edition. Provost and Co., 36, Henrietta-street, Covent Garden.

"Arlen Grange" has been some time before the world, and, like the other efforts of Mr. Gibbs' muse, has received no small meed of public approbation, for his narrations relate to ordinary life and such phases of feeling and passion as most of us have either personally experienced or seen operating in those with whom we have daily converse. Like the author's other works, it is pleasant to read and elevating to reflect upon, for he is always on the side of real morality and genuine religion.

The present edition of "Arlon Grange" is put forth as an invitation to artists to illustrate the work, and is beautifully printed, with a chaste and elegant binding; indeed, the book is itself an artistic object.

As we have not heretofore presented our readers with worthy quotations from this work, we may place before them some *morceaux* pleasant to read; and from which we think an artist might devise good illustrations from the suggestions the passages naturally induce to the mind.

The first presents the heroine Helen as grieving over the absence of her lover, Sybil coming in as a ministering angel. It is in blank verse:

Return we now to Helen and the Grange:
She knew, she owned to her own heart of hearts,
That Heatherfield had done a noble deed;
But with her woman's rash impulsive mood
She judged him harshly, almost angrily,
For doffing thus aside her offered troth:
"He did not love me, men can never love!
They are too wise and prudent! Woman's love
Sees nothing, and fears nothing of aught else,
Save loss of the one loved. Oh, could he feel
This wretched aching void, thro' which my thoughts
Wander with weary, spiritless despair—
Could he but see the darkening day-by-day
Of my young life, once bright as morning beam,
He had not left me on false honour's plea.
False! nay not false; shame on my angry mood
That thus maligns him, exiled for my sake.
But, oh, dear, absent wanderer o'er the seas,
Methinks thou didst not love me, else perforce
Against all thought, all hazard, fear of harm,
Thou wouldst have said, "Fly with me Helen, fly;
Life is not life, not worth the living out,
Parted from thee! Parted, ah, bitter word;
Why are these partings? why these choking sobs,
That ever and again rend out my heart
With keen remembered anguish?
Life so short,
And death will come so soon, when all must part;
Why all these partings then before death's hour?"

Alas! how often in our pilgrimage
This question hath been asked in bitter grief!
And who can answer it? Ah, do not try,
Complacent Pharisee, who never knew
What 'twas to love and lose; forbear your text;
The hard, cold, commonplace of pious cant,
Which thrust into the wounds of loving hearts
Not balsam, but sharp vinegar and gall!
'Tis other's love and gentle sympathy
That hath sole power o'er such griefs as these.

Such sympathy as soft-eyed Sybil brought,
And laid with tender and caressing hands
Upon the fever of her sister's brow.
Sybil, the soothing angel of the house,
Whose quiet charm of manner spread around,
Where'er she went, a sense of happy peace—
A gentle hush like summer eventide.

But Mr. Gibbs has not confined himself to the use of blank verse or one metre; and the following quotation will show that he is quite as much a master of the one style of poetry as the other:—

"There is sunshine in the west,
Tho' 'tis dark and dreary here,
And my heart is now at rest
From its sorrow and its fear.
He is coming! he is coming!
Even now he may be near.

Oh, how wide the seas have seemed!
Oh, how weary each year past!
Yet bright hope and I have dreamed
We should meet again—ay, here!
He is coming! he is coming!
Ever nearer and more near.

There's a horse upon the sand,
There's a ship upon the sea,
There's a boat draws near the land—
Yes, it brings my love to me!
He is coming! he is coming!
Hark! a footstep—yes, 'tis he!"

This last starts the idea that although the present edition of "Arlon Grange" has been published with the view to suggest to artists subjects for pictures, that the work contains passages that might be adopted by musical composers as words suitable for being set to music.

## FORBES ON THE TRANSIT OF VENUS.

"The Transit of Venus." By George Forbes, B.A. London: Macmillan and Co.

This work is a reproduction of a series of papers in *Nature*, in the form of a neat well-printed book of about a hundred pages, pocket size. It has a peculiar interest owing to the fact that the author is on his way to Honolulu, in company with Capt Tupman, who acted under the Astronomer Royal as organizer of all the British parties; there they will separate, Prof. Forbes taking a section of their party to the island of Owhyhee, or Hawaii, the scene of the murder of Capt. Cook, nearly ten years after his voyage to Otaheite to observe the Transit of Venus in 1769. This work is worthy of our hearty commendations.

## DR. BROWN ON BOTANY.

"A Manual of Botany, Antaomical and Physiological, for the Use of Students." By Robert Brown, M.A., Ph.D. Blackwood and Sons.

This is a work of very meritorious character. Mr. Darwin's researches in the fertilization of plants are fully considered, and a good index accompanies the volume.

## DR. PETTIGREW ON BLOOD-CIRCULATION.

"The Physiology of the Circulation." By J. Bell Pettigrew, M.D. Macmillan and Co.

This is a work of much interest, as Dr. Pettigrew treats his readers to some ingenious theories which will doubtless be accepted only with qualifications. The structure of the heart is well treated, being very completely described. A number of illustrations accompany the text.

## LITERARY ANNOUNCEMENTS.

The *Athenæum*, amongst others, gives the following: Messrs. Chatto and Windus, promise Charles Lamb's Complete Works in Prose and Verse, including the two series of "Elia," with the cancelled passages restored as first published in the *London Magazine*; together with "Satan in Search of a Wife," and other poems and humorous pieces, now first collected; edited, with notes, by Mr. Richard Herne Shepherd.

Messrs. Hurst and Blackett have in preparation a new work, entitled "Wild Life in Florida," from the pen of Capt. Townshend, of the 2nd Life Guards, the author of "Ten Thousand Miles of Travel," &c., in one volume.

A novel, called "Hope Meredith," by the author of "St. Olave's," and a Russian tale, called "Darkness and Dawn," by Miss Annie Grant, which is dedicated by permission to the Duchess of Edinburgh, will be issued in October, by Messrs. Hurst and Blackett. While naming these new novels, we may mention a story by Mr. Charles Gibbon, called "In Honour Bound," which will be issued in a week or two.

The monthly issue of Parliamentary papers during August comprises 50 Reports and Papers, 4 Bills, and 26 Papers by Command. Under the first of these categories may be mentioned a list of the places to which telegraphic weather intelligence was sent in 1873; a matter of signal importance (using the adjective in its ordinary, not in its technical sense), as indicating the progress made in the prediction of storms.

Mr. Charles Swain, the Manchester poet, died in September last at his residence, Prestwich Park, near Manchester. He was seventy-two years of age. For some years Mr. Swain has been in indifferent health. He will probably be remembered chiefly for "The Mind, and other Poems," published in 1831, subsequently to which he published several volumes of poems which attracted considerable attention when they were brought out.

Mr. Gardner, of Paisley, will issue next week his reprint of Hogg's Jacobite Relics. It will have as a frontispiece an engraving, by Mr. S. Freeman, from the portrait by Le Tocque, of Prince Charles Edward Stuart.

Messrs. Bell and Son have in the press a volume on British Popular Customs, or ancient usages extant in various parts of the British Isles, compiled by the Rev. T. F. Thistleton Dyer. It will be somewhat similar in character to Brand's "Popular Antiquities."

Dr. F. Hueffer is engaged on a translation of Schopenhauer's well-known book, "Die Welt als Wille und Vorstellung."

Messrs. Cassell, Petter and Galpin have in preparation, and will shortly publish, in serial form, an Illustrated History of the United States.

The death of Mr. Bryan Waller Procter, known to literature by the name Barry Cornwall, took place last month.

The College for Men and Women in Queen Square, Bloomsbury, recently commenced the session 1874-75 with a meeting of teachers, students, and others interested in education, which was held at St. George's Hall, Langham-place, on Monday, the 12th ult. The list of Occasional Lecturers and Examiners to the College has been strengthened by the addition of the names of the Dean of Westminster, Sir John Lubbock, M P., Prof. Clifford, Prof. Colvin, Mr. Humphry Sandwith, C.B., Mr. W. Spottiswoode, F.R.S., &c. The Saturday Evening Lectures for the coming October term include one upon "Ideal Commonwealths," from Prof. Morley; two from Mr. C. Newton, of the British Museum, "On the Greek Alphabet, its Derivation and History: the Materials for Writing used by the Greeks;" and "On Greek Inscriptions;" one by Mr. F. J. Furnivall, "On Chaucer: his Life and Works;" another by Mr. William Spottiswoode; while one or more "Discussions" are announced to take place under the presidentship of the chairman.

Mr. Justin McCarthy is writing a story of English and American life of the present time, to follow Mr. Francillon's "Olympia" in the "Gentleman's Magazine."

The next part issued by the Palæographical Society will contain some plates of photographic fac-similes from MSS., illustrating the period of the Utrecht Psalter.

The *Athenæum* states that Mr. Leighton, Mr. J. Pettie, and Mr. Frost, who accepted the office of judges in the "Arlon Grange" competition, have unanimously awarded the hundred guinea prize to the series of illustrations marked "M.B.," by Messieurs G. Montbard and A. Ballin.

## D. JONES' IMPROVEMENTS IN CONSUMPTION OF SMOKE.

David Jones, of Millburn, Inverness, Mechanical Engineer, has recently patented "Improvements in consuming or preventing smoke," which relate to a mode or modes of constructing a combustion chamber, with partitions or bridges in flue or flues or passage or passages of furnaces in steam boilers or otherwise, and admitting air therein so as to cause the smoke or unconsumed gases arising from the fuel to be thoroughly mixed with air in the said chamber, thereby preventing smoke. Such mode or modes consisting in erecting, disposing, or making in the flue or passage partitions or bridges across the same. The principal points of the invention are the use of partitions or bridges, which may, if for steam boilers, be constructed as a water space, or may be of fire-brick or any other suitable substance or material, and air may be admitted in the combustion chamber in different ways. For example, one way of admitting air to the combustion chamber is through the ash-pit and regulating damper entering the combustion chamber at an orifice which extends across the flue or passage, allowing the air to become mixed with the unconsumed gases in the combustion chamber, thus preventing the emission of smoke. The size of the combustion chamber should be proportioned to that of the furnace, and the use of a regulating damper may be dispensed with in some cases.

## TECHNICAL EDUCATION AND THE CITY GUILDS.

During the past month the Turners' Company of the City of London has been holding its annual exhibition of specimens of hand turning at the Mansion House. The exhibition, arranged in the ball-room, was divided into three sections, namely, stone work, lapidary work, and brass work, for the most part exhibits by competitors for the silver medal and the freedom of the company and City of London offered by this company to workmen or apprentices in England who may send in the best specimens of hand turning for the year.

The judges of the stone work were Sir Gilbert Scott, R.A., Professor H. Weekes, R.A., and W. Vazie Simons, Esq., but it is only fair to mention that the brunt of the work fell upon the last-named gentleman. The first prize in this section was carried off by Mr. Frederick George Bradbury, of Penzance, for a beautifully executed vase in marble, produced by hand work The second prize in this section was taken by Mr. Christopher Stone, of the Lizard Works, Cornwall, for a beautiful vase in Cornish marble. Another specimen which attracted a great deal of attention in this section was a black piece of marble, engraved with a beautiful floral design by means of steel points only, by Mr. John Britland, of North-street, Edgware-road. The judges of the lapidary work were Messrs. John Hunt, goldsmith, of New Bond street; James N. Foster, gem cutter, of Cumberland-terrace, Lloyd-square, and Professor Tennant, of the Strand. In regard to this section the judges reported:—That they were much pleased with the general good quality of the work exhibited, which showed considerable ability, but they regretted to say that they did not find any of the specimens exhibited in classes A and D (ruby, sapphire, emerald and spinel, and diamonds) showing that high standard of excellence they could have wished, for while the work entered in these two classes was of good average quality, there was no specimen that might fairly be described as perfect. In class B and C, topas, &c., seal stones, and cabochon work of all kinds, there was exhibited work of very high excellence, more especially the carved work in class C, sent by "Italia" and "Perseverance," which was equal, for perfection and beauty of workmanship, to any that had been produced. They also remarked with satisfaction that London lapidaries were turning their attention to diamond cutting, which has long been monopolised by the Dutch, but which was formerly carried to such great perfection by the London diamond cutters, that even to-day an "Old English cut" brilliant is taken as the type and model of a perfectly cut brilliant, and they hoped soon to see modern London diamond cutting at least equalling if it could not excel the old. Passing from these general remarks they had to state that in all sixteen names were entered for the competition; of these six exhibited specimens in class A (ruby, sapphire, emerald, and spinel), six in class B (topaze, aquamarine, crysolite, garnet, peridot, &c.), five in class C (seal stones and cabochon work of all kinds, irregular or fancy shapes, &c.), and eight in class D (diamonds). In class A, the first prize was awarded to Fred. Garret, an apprentice, 19 years of age; the second prize was carried off by Mr. R. C. Nockold; and the third by Mr. John Gorsuch. In class B, the first prize was taken by Mr. Alex. Wallace, the second by Mr. R. C. Nockold, and the third by Mr. Watts. In class C, Mons. Albertoldi carried off the first prize for a beautiful specimen of workmanship, and Mr. Spencer the second prize. In class D, Mr. Snook took the first prize, Mr. Parsons the second, and Mr. Watts the third. The first prize in metal turning was taken by Mr. Thomas Rossiter, of Bristol, who also obtained the freedom for a tazza, its merit lying chiefly in the accuracy of copying and nicety of finish. It was a specimen of pure hand turning finished with emery paper. The second prize was taken by Mr. William Bickle, of Wandsworth, for a binocular microscope, and it is worthy of note that the prize-taker in this instance is an engine fitter, and had gained his knowledge of the construction of the instrument from books only.

On 26th ult. the Lord Mayor, assisted by Mr. Sadgrove (the master of the company), Prof. Tennant, Mr. Simons, Sir Gilbert Scott, R.A. (who described some of the work of the competitors), and Sir Bartle Frere distributed the prizes.

The Coachmakers' Company has also been holding an exhibition of designs at its hall in the City.

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TO MEMBERS OF COUNCIL.

Council and Executive Meetings on Thursdays, November 12th and 26th.

Opening Meeting of Session on 26th November, at 8 p.m.

Council Meetings at 7 p.m.

Subscriptions are payable to Mr. G. A. Stretton, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. Campin, Sec.

## Proceedings of the Institute.

At the meeting of the Council and Executive on 15th of October, the subject of the opening dinner was discussed, and it was resolved that it would be desirable that it should, if possible, be held on 26th of November.

The question of the papers to be read at members' meetings of the Institute during the forthcoming session was considered.

The meeting nights for the ensuing session were settled, and a card of meetings for the session was ordered to be printed and issued to each of the members.

The Treasurer reported that he had examined the accounts of the Book-keeper and Collector, and found them correct.

The Treasurer also reported that he had written to the Proprietors of the "Scientific Review" with respect to a fresh arrangement being made in regard to that publication as the "Journal of the Inventors' Institute."

## Monthly Notices.

*A Geological Map of the whole of Australia*, including Tasmania, is to be attempted. Mr. Brough Smith has, it appears, already produced one section of this map.

*An Annual Geological Record*, similar to the *Zoological Record*, is proposed to be published to contain notices of all papers, both British and foreign, bearing upon geological subjects. The first volume is to include the literature of the current year, and will be edited by Mr. W. Whitaker, assisted by a large staff of contributors representing the several departments of geological science.

*Scientific Publications by Messrs. Churchill* have been recently announced, and in reference to this firm it is stated that Prof. Bentley, of King's College, and Mr. Trimen, of the British Museum, are preparing an illustrated work on Medicinal Plants. The plants which supply food and substances required by the sick and convalescent will be also included. Other works are "The Student's Guide to Human Osteology," by Mr. W. W. Wagstaffe, of St. Thomas's Hospital; a translation, revised by the author, of Prof. Frey's "Manual of the Histology and Histo-Chemistry of Man," by Mr. A. E. J. Barker; "Outlines of Animal Physiology," by Mr. W. H. Allchin; "A Handy-Book of Forensic Medicine and Toxicology," by Dr. W. Bathurst and Prof. C. Meymott Tidy; and "Air, Water, and Sewage," by Messrs. F. Sutton and W. Thorp.

*Mr. E. B. Taylor on Elementary Anthropology.*—This gentleman is engaged upon a manual of anthropology illustrated from photographs of actual persons belonging to each divisions of mankind. Messrs. Macmillan will be the publishers.

*The Death of M. Elie de Beaumont* is announced, in his seventy-sixth year. He was the successor of Arago in the secretaryship of the Académie des Sciences, but is, perhaps, best known by his long-continued labours in connexion with the geological map of France.

*The Chemical Composition of Ultramarine* is sought to be more fully demonstrated by the stimulus of a prize of one thousand Imperial marks for the best scientific and experimental work upon the chemical constitution of this substance, and the exact form of combination in which the sulphur exists. This prize is offered by the Society of German Ultramarine Manufacturers.

*The great Salt Lake* is now thought to be some twelve or fourteen feet higher than it was in 1847. In 1852 a perceptible permanent rise was evident; but from 1856 to 1861 a gradual subsidence of the waters took place. In 1862 the lake began to extend its area, and continued to rise until 1868, since which time the oscillations have been about equal.

*The Insulating Medium in Electrical Induction.*—In the last number of "Poggendorff's Annalen" is an important memoir by Dr. Brongersma, of Leyden, in which he investigates the part which the insulating medium plays in electrical induction. Faraday's theory of induction supposes that an electrified body acts upon a neighbouring conductor by the polarization of the dielectric medium; that in fact the electricity is propagated from molecule to molecule throughout this intervening substance. It has, however, been maintained that this theory is disproved by the investigations of Prof. Reiss. The object of Dr. Brongersma's paper is to describe a series of experimental researches, the results of which appear to support Faraday's views.

*The Spectrum Analysis of Chlorophyll, or the Green Colouring Matter of Plants*, is the subject of a memoir by M. Chantard, of Nancy, in the September number of the "Annales de Chimie et de Physique." Tinctures of chlorophyll exhibit a more or less complex system of absorption-bands, among which one in the red is peculiarly characteristic. Some excellent chromo-lithographs, exhibiting many of the spectra, accompany the paper. In these investigations M. Chantard has (says the *Athenæum* in its notice of this matter) followed the path originally opened up by Mr. H. C. Sorby.

*The Yorkshire College of Science* is commencing its first session. The subjects of study, under qualified professors, are mathematics, experimental physics, chemistry, geology, mining, and textile manufactures. The Company of Clothworkers of London have founded eight studentships, four of £30 each and four of £25 each.

*A poisonous wild vanilla*, it is stated by *La Liberté*, has been introduced into commerce as a substitute for the cultivated variety, which is not poisonous. This plant being largely used in flavouring chocolate, injurious consequences may result from the use of the uncultivated variety, and this cannot be too generally known.

*A New Relation between Heat and Statical Electricity* is the title of a paper in *Les Mondes* by Mr. A. W. Bickerton, in which he examines Dr. Guthrie's experiments, by which he established that a heated body does not act in the same manner in relation to positive and negative electricity, and describes his own, which, he thinks, justifies the following principles :—1. At low temperatures negative electricity is very easily raised by the air. 2. At certain temperatures the air appears to raise equally well both electricities ; but at elevated temperatures it is positive electricity that absorbs with the greater facility. 3. Electricity at high tension is able to be raised by the air as at the low temperatures; but in proportion as the tension diminishes the discharge does not take place, except as the air becomes more heated (*le décharge n'a lieu qui si l'air est plus en plus chaud*).

*Dr. Dittmar*, of Owen's College, Manchester, has been appointed to the chair of Scientific Chemistry in the Andersonian University, Glasgow, in the place of Dr. Thorpe, who is appointed the Professor of Chemistry in the Yorkshire College of Science at Leeds.

*The Comptes Rendus*, for September 14, contains no less than eight reports of commissions and communications on Viticulture, all of them dealing with the absorbing question of the ravages of the Phylloxera in the vineyards of France.

*A Chilian International Exposition* is to be opened on the 10th September, 1875. The articles designed for exhibition are classified into four sections : 1. Natural products in a crude state ; 2. Machinery ; 3. Manufactured articles ; 4. Fine arts ; and a special section devoted to public instruction. We ought to state that applications for space should be addressed to the President of the International Exposition of Chili, at Santiago, so as to reach that city before the 1st of January, 1875.

*Coppered Paper.*—It may be worth knowing that by plunging a sheet of paper into an ammoniacal solution of copper for an instant, then pressing it between cylinders and drying it, it is rendered entirely impermeable to water, and may be even boiled in water without disintegrating. Sheets so prepared, if rolled together, become permanently adherent, and acquire the strength of wood. This is given on the authority of the "Journal of the Franklin Institute."

## BRECHIN'S HEAT ECONOMISING APPARATUS.

### ATTACHABLE TO ORDINARY FIREPLACES.

James Brody Brechin, of Dundee, North Britain, has recently specified a patent for the above object. The intention of this noteworthy invention is to provide apparatus capable of being fitted with facility to ordinary fireplaces, and so as to economise fuel and increase the heating effects obtainable from such fireplaces, such improved apparatus acting so as to cause heat ordinarily wasted to be distributed ever a considerable surface of metal, which it permeates, and from which it radiates into the room, apartment, or space to be heated. The construction of the economiser is this: A metallic box is constructed and placed against or at a small distance from the wall above an ordinary fireplace, and made to communicate with the chimney by two passages. The chimney is blocked by a plate of metal between the two passages, so that the fire gases or heated gaseous mixture produced by the combustion of the fuel in passing up the chimney is compelled to enter and pass through the metallic box, which may be fitted with internal partitions, or partial partitons, to compel the fire gases to take a circuitous course through the box with the view of imparting more of their heat to it. At the part of the apparatus where the fire gases pass out of the box and re-enter the chimney a damper or valve is fitted for regulating the draught, and when necessary to be used to close the chimney against down draughts. This damper may, however, be placed at any other part of the apparatus, if found preferable, and the box may be formed of earthenware if desired.

## HARTLEY'S GLASS-LINED VESSELS.

Amongst recent new inventions are two patented by Joseph Hartley, a brewer, of Ormskirk, under the titles of "Improvements in the construction of fermenting vats, store vats, and attemperators used by brewers, rectifiers, British wine makers, and others;" and "A new or improved process for uniting glass to iron and other materials." The main idea is, that vessels in which liquors for human consumption are manufactured or stored are to be lined with glass.

There can be no doubt that vessels of such a character will prove generally acceptable, as there can be no danger of taint or impurity being communicated or contracted ; and as depositaries for liquors of great commercial value they must prove highly advantageous from their non-absorbent character.

We understand the invention is exciting considerable attention and criticism, and having had an opportunity of satisfying ourselves on the subject we incline to think it has overcome the difficulties which first strike us as being insurmountable in applying glass on a large scale for such purposes. The necessary support against pressure from large bodies of liquor is afforded by the iron or wood which forms the outer case of the vats.

We hope to give further particulars at a future time.

## DUTTON'S RAILWAY FACING POINTS.

The intention and purpose of this invention is to improve the safety of railway travelling by providing efficient means for ensuring a more certain and effectual movement, and securing of facing points on railways before a train is signalled to pass, and during the time any portion of the train may be on, or passing through, them, and to give a more gradual divergence from one line to another than has been usual, and for the better securing and moving of switches ; also to prevent the possibility of the points being foul in respect of both the tongues being open, even the slightest, at any one time, and to indicate whether the facing point is properly closed or not.

To accomplish this the inventor makes the switches from, say, twenty to twenty-two feet in length, and instead of connecting and moving the switch tongues together as at present, he connects and moves them separately, either by the separate motion of two levers, or the successive action of one lever, but in such a manner that only one tongue can be moved at a time ; and also instead of connecting the rod moving them at one point to the switch as at present, he connects the switch to the single rod by cranks at two or more places in its length, thereby holding the switch firmly and equally against the stock rail at different points in its length.

To secure the facing tongue close up to the rail and keep it there he fixes or places at the point of each tongue by preference a cam, moving on a stud or centre on the point chair, each of the said cams being connected to and moved by the opposite switch. It will follow that when either of the switch tongues is opened it will cause the other tongue, which then becomes the facing switch (if close up to the rail), to be secured in its place, and as the open or free switch cannot be closed while a train is passing or standing in them, the facing switch remains thereby secured.

In case anything should, by design or accident, prevent the proper closing of the facing point, it would be at once detected, for it would be impossible for the pointsman to move the other switch until the complete closing of the first.

In cases where the existing switches are not of sufficient length, and also in cases where it may be of advantage to prevent the closing of the open switch, either independently or in combination with the foregoing arrangement, it is purposed to fix a lengthening blade to one or both of the switch tongues as circumstances may require ; and at several points in the length of the switch and lengthening blades to fix to them or the connecting rods suitable transverse slides, moving upon chairs under and supporting the stock rail, so that a train upon the rails would prevent the slides from being moved, and the switches being unsecured or altered.

This, however, being a supplemental part is susceptible of being adapted for the object before stated in arrangement according to circumstances and position.

The inventor and patentee of these improvements is Mr. Dutton, of Worcester.

## QUIN'S IMPROVED CIGAR-CASES.

Richard Quin, of Poland street, Oxford-street, in the county of Middlesex, jewellery-case maker, has recently patented improvements in cases for cigars and similarly approximately framed articles. Cigar cases, as ordinarily constructed, are interiorly simple spaces for holding a number of cigars, or have pockets to hold several cigars, each pocket being intended to hold one cigar only. Now, this improved cigar case is in the interior an open space, fitted with a spring holder, which keeps the cigars tightly fitted in the case in such manner that one cigar can be withdrawn from the case without difficulty, leaving the other cigars as firmly held in the case as before the withdrawal of that one.

The means whereby the invention is carried into effect is by preference as follows: —A case is constructed of leather, metal, or other material closed at the ends with the exception of a small opening at each end, which, by preference, is made for admission and extraction of one cigar only at a time. Inside the case is a spring and facepiece or spring arrangements of any suitable shape or construction. In order to fill the case the cigars are successively put into the case through the openings before described, and in order to extract same, all that is required is to apply the finger at the opening in one end, and the cigar issues from the corresponding opening at the other end. These cases may also be fitted in order to extract the cigar, with a slide which will push the cigar out in the same manner, such slide being spring or otherwise, and said slide may be fitted with a shoe, so that the opening at one end would be closed, and the cigar be extracted from the other. There may be a tucker at each end. In some cases instead of both ends of the case, being closed up except at the orifices, one end only may be so far closed up, and the other may have a moveable cap or otherwise, or both ends may be left open and have a tuck flap ; or any convenient exterior case or cases can be adopted so long as the spring arrangements before referred are used. These cases are provided with spring holder arrangements, which so act that one cigar or article can be withdrawn at a time, and others in a case remain firmly held therein.

## STEVENSON'S RECOVERING FURNACES FOR SODA LYES.

This invention, patented by Charles Stevenson, of Milngavie, in the County of Stirling, North Britain, under the title of "Improved evaporating or recovering furnace or apparatus to be used for evaporating the water in soda lye, or liquids containing any valuable sediment or body, so that the same may be rendered fit for being again used for manufacturing purposes," has been recently specified, and relates to exposing and distributing to the action of fire and heat the soda lye or liquid by means of roasting beds, perforated trays, slits, rose pipes, or whatever may best distribute or break up the said liquid into raindrops or spray; same to be placed in position as found necessary, the soda lye being allowed to percolate the said trays, or slits, or pipes by its own gravity, and also forcing the liquid through the said perforations by means of a force-pump, reserving the right to force in longitudinally by force-pump a spray of soda lye or liquid over the flame; all for the purpose of breaking up the liquid and exposing it to the full action of the flame, as afterwards described.

Likewise, this invention relates to the use of agitators in the furnace for the purpose of stirring up the sediment or ash which will fall from the evaporated lye or liquid so as to expose more fully any moisture which may still remain in the sediment, whatever it may be, and, at the same time, serving the purpose of a scraper in drawing forward to a bench formed in the furnace the recovered ash or sediment. As instancing means whereby is carried into effect the said invention, a furnac is herein described in detail.

The furnace is built of fire brick sides, ends, and arches, or beds, and consists of a fire-place or places placed as may be thought best to give the greatest heating power. The length of furnace and beds and breadth of same will be determined by the evaporating capacity required. The beds or flues are formed by arches thrown from side to side of the furnace. The number of same will also be determined by the required evaporating capacity. At one end immediately over the top bed is placed perpendicularly a pipe or retort with open mouth looking downwards.

On top of said pipe is placed the supply cistern to contain the liquor to be evaporated, and under which will be placed trays or perforations of the best description, so as to break up the soda lye flowing from the cistern, or it may be forced in by force-pumps. It afterwards is arranged so as to flow over all the beds, the flame at the same time passing over it.

In the bed described will be placed agitators or mixers which in working back and forward will stir up the ash or sediment and expose it fully to the flame, so that any moisture it may still retain will be completely evaporated, leaving a dry ash or sediment, which is brought forward to a bench, and falls into a pit behind as it accumulates.

The great advantages which will be derived from the above improvements will be that the lye or liquid will be evaporated in half the time that it is by the old system; and the saving of fuel and labour, as the agitators will do the work which a man has to be in constant attendance to do.

It is stated, on apparently good authority, that a vein of coal has been discovered in Colorado which contains the trunks and limbs of trees resemblings red cedar, transformed into bright hard coal resembling jet. If this is confirmed by further observations, and the metamorphosed wood does not prove to be a lignite or brown coal, an important question connected with coal-formation will be answered.

## ZOOLOGICAL SOCIETY OF LONDON.

The first scientific meeting of this society for the session 1874-75, will take place at their house, on Tuesday, the 3rd of November, at half-past eight o'clock, p.m., when the following communications will be made:— 1. The Secretary: Report on the recent additions to the society's menagerie. 2. Mr. A. R. Wallace, F.Z.S.: Exhibition of some rhinoceros horns obtained by Mr. Everett in Borneo. 3. M. L. Taczanowski: Liste des Oiseaux recueillis par M. Constantine Jelski dans la partie centrale du Perou occidental. (Received 12th August, 1874.) 4. Mr. A. H. Garrod, F.Z.S.: On points in the anatomy of the parrots which bear on the classification of the sub-order. (Received 15th September, 1874.)

## SOCIETY OF ENGINEERS.

At the opening meeting of this society, on Monday, 5th ult., Mr. P. Nursey read a very interesting paper "On Mechanical Puddling."

## SOCIAL SCIENCE CONGRESS.

The Social Science Congress met at Glasgow during the past month; various important topics were discussed—the General Amendment of the Law, Repression of Crime; and Public Health, in regard to which Dr. Lyon Playfair, President of the Health Section, delivered an able address. In the earlier part he dealt principally with the sanitary condition of Scotland, throughout which the mortality was augmenting in every class of district, urban and rural. The laws of health were relentless in their operation. Among the ancients this fact was fully recognized. Moses was the most practical of all sanitary reformers. But when the civilization of the Egyptians, the Jews, the Greeks, and the Romans faded away, the world passed through dark ages of mental and physical barbarism. For a thousand years there was not a man or woman in Europe that ever took a bath (!) Hence the terrible plagues and epidemics of the middle ages. It required some striking examples, such as the plague of London, and the immunity from it enjoyed by Oxford, in consequence of the assembling of the Court and Parliament there, and the cleansing which the city then underwent, to arouse men's minds. Gradually, however, it came to be understood that public health can only be insured by cleanliness, and the conviction has been growing. But public action was necessary as well as private conviction. Parliament must enact for this country the commandment, "Thou shalt not pollute rivers." It must take steps to insure that every human being shall have a full supply of fresh air as well as of pure water. From 2,000 to 3,000 cubic feet of air should be allowed to pass through a chamber every hour for each person sleeping or living in it. Light and air are as necessary to the dwellers in cities as to the trees in a forest. Sanitarians are now generally disposed to believe that the death rate in urban districts need not necessarily exceed 17 in 1,000; but in Glasgow, and even in London, where the rate is very low, we were a long way behind that still. It was not so much new laws that were required as more efficient administration of those already in existence. The local government of the country was in a state of arrested development. Dr. Playfair concluded with an eloquent peroration, showing how, in the wonderful scheme of our existence, death and life rapidly appear in correlation, and past generations of animals, by a process of dissolution, produce living generations by a process of evolution. Education, general and technical, also furnished subjects for discussion; but we have not been able to ascertain that the Patent Laws were dealt with, although Mr. Thomas Webster, Q.C., and Mr. Macfie, ex-M.P., were both of them present at the Congress, and took part in its proceedings.

## APPLICATIONS FOR LETTERS PATENT.

*Continued from page 154.*

links, gloves, and other articles of jewellery and dress.—J. K. McMyn and T. Taylorson. Mules for spinning and doubling cotton, wool, and other fibrous materials.—A. M. Clark. Portable or table fountains (com.)

On August 4th.—2691 to 2702.—D. Baudelot. Burners for burning mineral essences and lamps for the same purpose.—John Rigby and Jos. Rigby. Apparatus for lighting and ventilating. —E. Hunt. Manufacture of sugar and apparatus therefor (com.)—E. Aldous. Apparatus for preventing the waste of water in cisterns, tanks, and such like receptacles.—R. Marsden. Horse shoes.—G. T. Bousfield. Dental engines, parts of which are applicable to other purposes (com.)—J. Greenhalgh, J. Cooper, and W. Goulding. Machinery for opening and cleaning cotton and other fibrous substances.—S. Clayden. Compound regulating governor gas generator.—L. J. N. Mouret. Arrangement and construction of model globes driven by clockwork for the purpose of demonstrating at all times all the astronomical phases of the earth with reference to the sun. (Complete specification.)—J. G. Wagstaff. Water-heating apparatus suitable to be employed for warming conservatories and for other purposes.—R. Hodgson. Mode of utilizing sawdust and shavings. —J. Roe, jun. Heating, drying, and evaporating.

On August 5th.—2703 to 2720.—C. Chandler and W. H. Southan. Surgical plaisters and other bandages.—H. Bycroft. Pipes for conveying beer and other liquids.—A. C. MacLeod. Projectile for guns.—F. T. Bond. Sifter and distributor of ashes and other absorbent or deodorising materials, in connection with dry closets and commodes.—J. S. Raworth. Machines for spinning and doubling fibrous materials.—J. C. Haddan. Direct reduction or treatment of sulphides, oxides, and metallic carbonates in reverberatory furnaces, with gas produced from the decomposition of water (com.)—M. Mackay. Manufacture of solvents for certain resins and gum-resins.—S. Bennett. Construction of coke ovens and furnaces, whereby the heat is utilized for the drying of sewage and other matters containing moisture.—G. E. Else. Valves or cocks.—W. R. Lake. Elliptic springs (com.) (Complete specification.) — J. H. Johnson. Treatment of saccharine solutions (com.)—W. Welch. Spring mattresses and bedsteads, also partly applicable to the seating of sofas, chairs, and other similar articles. — A. Smethurst. System of advertising, and apparatus employed therein.—M. Atock. Combined machine or tool for boring, turning, and key-bed grooving. G. Haseltine. Method of and apparatus for effecting the illumination of compass cards, clock-dials, and steam and water gauges, and for other like purposes (com.)—R. Robinson. Machinery or apparatus for bending metal plates or sheets flat, angle, and other sectional bars.— W. R. Lake. Umbrellas (com.)—G. H. Smith. Applying awnings or coverings to tramway cars and other such-like vehicles and steamboats.

On August 6th.—2721 to 2729.—G. Rischmuller Motive power which is self-operating and self-sustaining. — E. Newcomb. An improved car replacer. (Complete specification.) —F. Magny. Impermeable fabrics or hangings for walls and other decorative purposes.—R. Currer. Signalling on railways and apparatus therefor. — T. H. Gittins. Construction of storehouses for storing petroleum and spirits.— P. Zadig. Construction of pavements for roadways and for other like purposes (Complete specification.)—J. P. Pieri. Manufacture of cartridges for breech-loading fire-arms and ordnance.—W. Tregay. Machinery for drilling or boring rocks and other hard substances.—A. V. Newton. Machinery for manufacturing fish-hooks (com.)

On August 7th.—2730 to 2744.—H. Brinsmead. Methods employed for cleaning rotary screens with or without adjustment of the wires.—J. Eaton. Construction of apparatus for stretching hat bodies.—W. E. Gedge. Asphaltic fabric for roofing and for other purposes (com.)—W. E. Gedge. Quilted fabric for covering steam engines and for other purposes (com.)—C. D. Abel. Preparation of loaf sugar and apparatus for that purpose (com.)—W. H. Beck. Removal from hard feed water of those matters which form deposits or incrustations in boilers or other heating vessels (com.) (Complete specification.) G. Griot and L. Polito. Rendering textile substances water and damp proof.—D. Holstead. Looms for weaving.—T. Browning and G. J. Scott. Slide valve.—T. Archer. Machines for crushing ores and other hard substances.—H. A. Lyman and R. Stokes. Busks for stays, corsets, and analogous articles.—G. Haseltine. Machines for hammering or forging metals, drilling and channelling rocks, riveting, and other like operations (com.) (Complete specification.)—W. Payton. Valves for controlling the delivery of water or other liquids from or into pipes, cisterns, tanks, or other vessels or apparatus.—E. Haughton. Construction of ships' cots or berths, and suspending and arranging such cots or berths, and also ships' couches and hammocks.—J. Stephens. Apparatus to facilitate the shooting of rockets, harpoons, and other missiles.

On August 8th.—2745 to 2755.—J. H. Small. Wheels for omnibuses, railway or tramway carriages, and other vehicles.—J. L. de Montoison. Separating the hair or wool from fresh or dry skins, and preserving the hair or wool in its natural state, as if cut from a live animal.—J. Reade and F. Hurd. Compressed air cavity caps and pads for affording ease and safety in travelling, in mining, and in other cases, also apparatus for filling and retaining air in the same.—J. Smith. Beetling machines.—C. J. T. Hanssen. Method of producing heat.—G. G. G. de L. Byron. Automatic feed for sewing machines (com.)—G. G. de L. Byron. Fuel for metallurgical and other purposes (com.)—T. Hyatt. Working, forming, ornamenting, and cutting glass, apparatus for the same, and the application of such glass to architectural and other uses.—J. G. Tongue. Wind musical instruments arranged with pistons or valves (com.) D. M. Osborne. Harvesting machines.—W. R. Lake. Apparatus for preventing drowning, and supporting persons swimming or learning to swim (com.)

On August 10th.—2756 to 2767.—T. Wrigley, G. Bradley, and J. Manners. Consumption of smoke, and the apparatus employed therefor.—W. Ireland. Printing textile and similar fabrics, and machinery or apparatus employed therefor.—J. P. Scott. Motive power engines, applicable also for pumping (com.)—I. S. McDougall. Fire bars.—R. Hosking and W. Blakewell. Rock drills.—W. R. Lake. Governor for steam engines (com.)—J. G. Ingram. Manufacture of india-rubber washers or packing pieces.—W. Mort. Machinery for the manufacture of ice, and for the cooling of liquids, rooms, or spaces (com.)—M. J. B. Couhault. Apparatus for clipping horses and other animals.—J. H. Betteley and T. Sharer. Brakes and other parts of tramway cars.—J. Stott and J. Barker. Machine or apparatus for drying textile fabrics.—A. V. Newton. Embroidering apparatus applicable to sewing machines (com.)

On August 11th.—2768 to 2773.—H. Earl. Reaping and binding machines.—L. A. Lenègre. Apparatus for bevilling the edges of cardboard (com.)—H. A. Dufrené. Method of preserving animal and vegetable substances, and apparatus employed therefor (com.)—R. Parker. Construction of travelling ovens.—R. Gray and F. B. Taylor. Machinery for the manufacture of chains, chain-cables, links for railway couplings, and other like articles (com.)—H. Müller. Centrifugal machines or hydro-extractors.

On August 12th.—2774 to 2786.—T. J. Smith. Apparatus for weaving circular fabrics (com.)—W. Bond. Printing machines.—H. A. Dufrené. Portable apparatus for administering vapour baths (com.)—C. Axon. Apparatus for coupling railway carriages.—E. P. Hardcastle. Apparatus for opening preserved meat, fish, potted meat, condensed milk, and other hermetically sealed tins or canisters.—E. Sykes. Stoves.—B. S. Cohen. Manufacture of artificial ivory. J. Lumb and S. Bottomley. Steam-engine lubricators.—W. Darley. Apparatus for raising sunken and for removing stranded ships or vessels, also for lifting heavy weights under water, and for aiding in the performance of submarine engineering operations.—F. B. A. R. de la Bastie. Process of tempering flat and shaped glass, and furnaces and machinery to be employed therefor. (Complete specification.)—J. Goucher. Beaters and beater plates for threshing machines.—M. Dittenhoefer. Combs.—A. Payne. Construction of concrete floors and roofs.

On August 13th.—2787 to 2804.—F. de Mornay. Centrifugal machines for treating sugar.—J. Richards. Fastenings for solitaires, sleeve-links, studs, and other articles of jewellery and dress.—M. Pearson. Looms for weaving narrow fabrics.—G. Huntriss and J. Swinburn. Machinery for tunnelling, holing, cutting, drilling, and getting coal or other minerals.—P. Chenaillier. Apparatus for extracting the soluble matters from wood or other substances.—G. Caton. Apparatus to be employed in connection with fire grates used for domestic and other purposes.—T. Cass. Furnaces of steam boilers and other heaters.—T. Terrell. Castors.—J. H. Johnson. Generating and applying motive power (com.)—H. W. Whitehead. Drawing-off apparatus of gill boxes and carding and balling machinery used in the drawing and carding of wool, flax, tow, silk, cotton, and other fibrous substances (com.)—F. St. J. Jones. Taps and valves for regulating the flow of gas and other fluids.—J. Y. Betts. Preventing incrustation in steam boilers.—E. T. Digby, C. Gandy, W. Foyl, jun., and E. B. A. James. Tonic preparation of liquid extract of beef or meat (partly com.)—F. J. Cheesbrough. Automatic coupler and buffer for railway rolling stock (com.)—A. Browne. Bolt and nut lock, and machinery to be employed for the manufacture thereof (com.) (Complete specification.)—M. Henry. Apparatus for obtaining ammonia from waste products and other matters (com.)—S. E. Asquith and F. A. Greenwood. Spinning and twisting machinery.—W. S. Hollands and J. A. Ilbery. Treatment of oils and fatty substances.

On August 14th.—2805 to 2812.—A. B. Brown. Hydraulic bolt-making machinery, and pumping apparatus suitable for actuating such machinery. J. Guy, C. J. Guy, and F. S. Guy. Stationery cabinets and other similar articles.—A. F. de Hemptinne. Appliances and arrangement of apparatus for the manufacture and concentration of sulphuric acid.—T. Moy. Aërial navigation, and apparatus for effecting the same.—N. Marshall. Machinery and apparatus applicable to circular looped fabric machines for making fancy hosiery. (Complete specification.)—G. Haseltine. Railway carriage wheels (com.)—G. Haseltine. Apparatus for registering and classifying the fares of passengers (com.)—T. Henderson. Apparatus for supplying fuel to furnaces.

On August 15th.—2813 to 2826.—R. Weldon. Printing hosiery goods.—G. R. Wood. Steam boiler and other furnaces.—W. H. Smith. Treating metals and their alloys by subjecting them to the action of liquids, gases, vapours, and apparatus employed therein, and for the manufacture of gas for illuminating and heating purposes.—A. Wilson. Mode of and apparatus for releasing ingots from their moulds.—G. G. de L. Byron. Springs for railway and other carriages and waggons (com.)—T. Beecroft. Sewing machines.—Z. B. Stearns. Machinery for the manufacture of boxes for containing matches and for other articles (com.) (Complete specification.)—A. Strugnell, M.A. Apparatus for heating by means of hot water.—I. Baggs. Manufacture of light gases, and method of inflating balloons therewith (for military and other purposes), and machinery and apparatus for such purposes, and for directing, guiding, propelling, and managing such balloons.—G. H. Forbes. Manufacture of cement.—A. M. Clark. Treatment of woven fabrics (com.)—S. H. Johnson, F.C.S. Cocks or valves.—W. B. Espeut. Apparatus for evaporating cane-juice and other liquids.—W. B. Espeut. Machinery for expressing the juice from sugar-cane and beetroot, and for other such like purposes.

On August 17th.—2827 to 2836.—T. C Fawcett. Brick making and pressing machines.—W. Payne. Liquid measure.—W. Seaton. Permanent way of railways.—D. Halmshaw. Apparatus for extinguishing fire in mills, warehouses, public buildings, private dwellings, steam or other ships, and landing stages or other structures.—F. Schroeder. Locking means to pins of brooches and such like articles.—G. Haseltine. Sewing machines (com.)—J. C. Peacock. Non-conducting materials especially applicable for use where retention or exclusion of heat may be required.—H. F. Snow. Braces and suspenders (com.)—A. M. Clark. Sewing machines (com.)—F. Bird. India-rubber tire for carriage wheels.

On August 18th.—2837 to 2849.—H. Handyside. Manufacture of chains or cables.—J. M. Houghton. Brakes for carts and other two-whee vehicles.—G. F. L. Meakin. Methods of manufacturing and securing ridging to roofs of buildings.—A. H. Cramp. Combined smoothing, polishing, and fluting iron.—F. de Lalande. Treatment of alizarine for the production of different colours or hues therefrom in dyeing and printing.—J. C. Mewburn. Steam-gauge cocks, also applicable to other purposes (com.)—E. L. Roberts. Ventilating beds and couches, in sleeping apartments, hospitals, cars, and vessels.—R. R. L. Rosoman. Construction of iron-clad and other vessels.—R. McGlasson, jun. Valve gear for steam engines.—B. Russ. Generation of steam and the economizing of heat.—B. Russ. Manufacture of gas and the apparatus connected therewith.—A. Browne. System and apparatus for ascertaining at a glance any desired result in the multiplication of figures (com.)—A. L. Freund. System or method of domestic cooking, and new apparatus or utensils to be employed therein.

On August 19th.—2850 to 2863.—J. E. F. Ludeke. Machinery or apparatus for obtaining and applying motive power, and turbines and pumps applicable thereto, parts of which are applicable to raising water and other liquids or fluids, and to other useful purposes.—J. W. Jones. Manufacture of clips, slides, or fastenings for boots, shoes, and other like purposes.—P. Cameron. Construction of portable tables.—J. T. Price. Machine ruling.—H. G. Avery. Ladies' dress suspenders.—D. Leonardt and H. Hewitt. Construction and manufacture of metallic and other boxes for holding steel pens and other small articles.—F. Whaley. Pistons.—T. Newcomb and T. H. Newcomb. Machinery for cutting wood.—T. Appleton. Manufacture of stockings in circular knitting frames.—J. Booth. Apparatus for the manufacture of fabrics in twist lace machines.—W. R. Lake. Chucks for holding tools in lathes and other like machines (com.)—F. Page. Looms for weaving.—C. Williamson. Manufacture of crinolines and bustles.—J. Lawson. Machinery for preparing flax, jute, hemp, and similar fibrous substances.

On August 20th.—2864 to 2873.—J. H. Carter and J. H. Carter, jun. Apparatus employed for collecting fares, checks, or tickets on public conveyances, theatres, and other places.—C. Lambert. Gutterings or watercourses for buildings, and appliances connected therewith.—S. Anderson. Apparatus for facilitating the cutting of corks, bungs, shives, and other similar articles into parallel, round, or tapered shape.—W. Truswell and R. W. Holden. Construction of stoves or other heating apparatuses for warming and ventilating public and private buildings, baths, hothouses, drying houses, and Turkish baths.—W. Gibson. Construction of spindles employed in mules for spinning cotton and other fibrous substances.—W. F. Batho. Permanent way of railways (com.)—E. T. Hughes. Boots and shoes (com.)—W. Pierce and T. R. Hutton. Driving sewing machines.—J. W. Butler. Apparatus for moulding concrete pipes, parts of which apparatus are also applicable to the drilling of rocks and other like purposes (com.)—J. H. Johnson. Machinery or apparatus for folding or plaiting fabrics (com.)

On August 21.—2874 to 2882.—W. P. Gregg. Roller skates, and which he terms improved wheel skates.—W. Morgan-Brown. Composition for printers' inking rollers and other purposes, and the process of making the same (com.) (Complete specification.)—A. de Pindray. Form and arrangement of steam boilers, and of tubes for the same, for the rapid production of steam for prolonging their durability without the risks of explosion often arising from the irregular distribution of the heat; also for effecting economy of fuel.—C. A. Hardy and A. E. Stayner. Novel method of and appliances for attaching picks and other eyed tools to their shafts or handles.—J. N. Aronson. Lamps or lighting apparatus.—A. Burkard. Portable ready reckoning apparatus.—J. Houghton. Construction of taps or valves.—W. Hamer and A. Giles. Construction or moulds or "flasks" for making hollow and other castings, and a new or improved composition or material for lining same (com.)—M. Henry. Railway carriages and other carriages (com.)

On August 22nd.—2883 to 2889.—G. G. de L. Byron. Treatment or manufacture of cast iron. F. Wirth. Disinfecting or fumigating candles and pastiles (com.)—J. Jackson. Bobbins for spinning and doubling cotton and other yarns.—F. Neves.

Machine for brushing ladies' and gentlemen's hair.—T. Browett. Machinery for forging or stamping metals.—R. Hamlyn and H. L. Farrer. Tanning hides, and apparatus employed therein. —J. T. Jones. Sewing machines. (Complete specification).

On August 24th.—2890 to 2900.—T. C. Fidler and W. J. Cockburn-Muir. Rolling stock of railways and tramways.—J. Keighley. Looms for weaving, and apparatus connected therewith. —W. H. White. Self-acting lever machine by means of certain levers, weights, and springs in the propelling and steering of ships, and in propelling all kinds of machinery that is or can be worked by steam power.—A. Payne. Process for the manufacture of sulphur-acids and of sulphites, bisulphites, and sulphates.—D. Hulett. Street and other lamps or lanterns, and apparatus for regulating the supply of gas thereto and to other gas burners.—F. A. R. Russell. Grates for domestic fire-places and similar uses for saving fuel and greatly preventing smoke.—F. Tommasi. Hydro-thermic press.—F. Tommasi. Hydro-thermic motive-power engine.—E. Hawkins. Cinder sifters and collectors.—J. Dodd. Mules for spinning and doubling cotton and other fibrous materials.—N. D. Spartali. Construction of propellers and arrangement of the engines and driving gear for actuating the same.

On August 25th.— 2901 to 2910.—J. Knowelden. Steam, water, or other fluid engines.—J. Hardy. Traversing crank arrangements for motive mechanism. — E. Wright. Operating sewing and other treadle machines (Complete specification.) —C. M. Lloyd. Window frames and hanging of window sashes.—F. Trevisany. Manufacture of metal show tablets for advertising purposes. —T. Y. Ménard. Brakes for carriages on common roads.—F. Tommasi. Hydro-thermic riveting machine.—F. Tommasi. Hydro-thermic punching machine.—T. Garnett. Dry earth, ash, and other closet apparatus.—R. G. Stubbs. Apparatus applicable to venetian and roller blinds.

On August 26th.—2911 to 2926.—W. Ley and G. Shearer. Tube plug or stopper.—J. Deleenaer. Tip caps for umbrellas and parasols.—G. Thomson and G. Watson. Compound india-rubber sheets or surfaces applicable to various useful purposes.—W. E. Teale. Mining lamps and apparatus connected therewith.—F. B. Hill. Connecting apparatus for coupling hose and other pipes, and securing covers on pipes and in other situations.—G. Miller and B. W. Raine. Machinery for rolling bars for the manufacture of shoes for horses and other hoofed animals.—F. Cole. Apparatus for opening, shutting, and securing window sashes.—L. P. Casella and S. G. Denton. Thermometers.—T. White. Racks or frames for meat and other dishes.—J. C. Ramsden. Apparatus to be employed in the manufacture of gas for heating or illuminating purposes.—G. A. Wilson. Rotary web printing machines.—H. Portway. Looms for weaving.—J. Carter. Attaching harness traces to vehicles, and for readily detaching the same therefrom.—R. Baxter. Instrument to be employed in slaughtering oxen, horses, and other animals.—R. Dods. Portable and other forges.—A. Barraclough. Woven fabrics and means of producing the same.

On August 27th.—2927 to 2940.—J. Young. Covers of umbrellas and parasols.—F. J. Cheesbrough. Machine for crimping or folding leather, cloth, or other like materials used in the manufacture of boots, shoes, harness, travelling bags, trunks, and other like articles (com.)— P. R. de F. d'Humy. Call bell.—W. A. Lyttle. Furnaces. —W. Evans. Furnaces used in the manufacture of iron.—J. B. Holroyde. Tool or appliance for calking boiler plates, ship plates, and other metallic plates (com.)—E. T. Hughes. Apparatus for facilitating the construction of submarine tunnels and other works below water (com.)—J. Noad. Boats and vessels applicable especially to saving life at sea.—J. Bolton. Apparatus for preparing and moulding artificial fuel, applicable also for moulding other materials. —W. R. Lake. Cars or carriages for railways, tramways, or roadways (com.)—J. Sainty. Machines for dressing corn and seeds of all kinds.—H. A. Silver. Manufacture of and additions to the stocks, butts, heel plates, and locks of guns, rifles, and other similar weapons. —W. E. Newton. Process for treating wood and other analogous substances, for the purpose of obtaining therefrom useful fibres and other valuable products (com.)—W. F. Braun. Constructing the permanent ways of railways.

On August 28th.—2941 to 2951.—C. Gowans. Arming or embossing presses.—F. Wilkins. Wheel and other skates.—R. F. Flood. Domestic fire escape.—H. Fradley. Check registering apparatus.—J. Macintosh. Hardening glass and other substances, and the application of such hardened substances to various useful purposes.—W. Morgan-Brown. Breech-loading firearms (com.)—H. J. Porter. Trusses.—G. Wilson. Sewing-machines.—D. Taylor and W. Taylor. Looms for weaving.—J. Y. Smith. Railway brake apparatus.—A. M. Clark. Transport or conveyance of merchandize and passengers by railway (com.)

On August 29th.—2952 to 2964.—W. F. Lotz. Means of suspending chandeliers for gas or other lights, and adjusting them to the required height (com.)—J. Underwood. Coating and preserving the surface of metallic handles and plates in coal boxes and other cases.—L. V. Léniau. White metallic alloy.—G. Grillone. Mechanism for starting sewing-machines.—S. S. Tiffany. Apparatus for the manufacture of paper pulp (com.)—P. W. Flower. Processes of pickling iron plates, and coating the same with tin or other metal.—A. Easton and W. W. Pritchard. Embroidering or sewing and machinery or apparatus employed therefor.—W. L. Powleson. Apparatus for increasing combustion, creating draft, burning smoke, and saving fuel in steam-boiler furnaces.—J. R. Danks and R. P. Walker. Cut nails.—N. Thompson. Means for stopping bottles, jars, and other hollow articles. W. E. Sudlow. Rotary engines for obtaining motive-power, and for raising and forcing fluids. —J. Bickerton. Paper cutting machines (com.) —W. Miller. Equalizing or distributing pressure.

On August 31st.—2965 to 2977.—S. Kneebone and R. Gay. Pawl or retaining clip for pulleys and other similar lifting or winding apparatus.—G. Cheadle. Flooring cramps.—J. C. Eddison. Apparatus employed for consuming smoke and economising fuel.—A. M. Silber. Apparatus for lighting and heating purposes.—W. Walker. Apparatus for condensing steam.—J. Smith. Looms for weaving.—H. A. Dufrené. Motive-power (com.)—W. Morgan-Brown. Means for counteracting motion in supports for berths, cabins, sofas, tables, and other like articles in ships or in travelling carriages (com.)—F. Blazicek and G. W. M. Bauer. Apparatus for the complete and smokeless combustion of solid fuel.—W. R. Lake. Machines for forming heel counters or stiffeners (com.)—T. Lane. Means for economising fuel in open fire-places.—J. J. Higgins. Umbrella runner.—F. Trash. Fire-indicating and alarm apparatus.

On September 1st.—2978 to 2963.—J. Johnson and E. Andrew. Metallic packings for pistons, air-pump buckets, valves, and other purposes.—H. Conradi. A machine for cutting threads on screws, bolts, and nuts, to the number of four and more at one operation, from one half inch to one and a-half inch in diameter and upwards, provided with self-acting disengaging arrangement of screw-stock and dies or taps (com.)—W. R. Watson and R. A. Robertson. Fixing the tubes in steam clarifiers and evaporating pans.—E. Smith. Improvements applicable to "coilers," more particularly when used in connection with "drawing frames" for preparing cotton and other fibrous materials.—A. Sauvée. Apparatus used for dyeing materials, either woven, spun, or in skeins or hanks (com.)—C. Deguine. Hearths, ovens, furnaces, stoves, and fire-places.—W. A. Lyttle. Manufacture of iron and steel.—V. Favier. New beater of a cereale beating machine.—E. K. Heaps and W. Wheatley. Heating and cooking apparatus.—B. Hunt. Packing for piston rods, valve stems, and other similar uses (com.)—B. J. B. Mills. Soldering apparatus, and the manufacture of parts thereof (com.)—J. K. J. Foster. Apparatus for extinguishing fire, applicable also for distributing water for other purposes.—R. D. Milne. Rotary steam engines. (Complete specification.)—H. Bycroft. Apparatus for cooling worts and other liquids, and for condensing vapours.—S. Butler. Manufacture of ornamental single Mechlin lace in twist lace machines.—G. H. Goodman. Machinery for breaking stone and other hard substances. (Complete specification.)

On September 2nd.—2994 to 3008.—W. Morgan-Brown. Machines for uniting the soles and uppers of boots and shoes, and fastenings to be used therein (com.) (Complete specification).—S. A. Luke. Apparatus for moulding and compressing small coal and other substances.—H. E. Brown. Carriages.—C. L. Lustig. Metal and enamel work. (Complete specification).—J. T. Cardon. Machines for breaking, stripping hemp, flax, Indian grass, ramie, and other textiles.—P. Jensen. Transmitting and printing telegraphic messages and apparatus therefor (com.) —H. Wilde. Machinery or apparatus for excavating coal and other minerals.—J. H. Kenyon and J. Kenyon. Machinery for carding cotton and other fibrous substances.—A. M. Clalk. Pianofortes. (Complete specification). — A. McDougall. Manufacture of sulphate of soda and of sulphate of potash.—J. Burgess and A. Fenton. Corkscrews.—W. Hunt. Apparatus for the manufacture of sulphate of soda and sulphate of potash.—H. Highton. Submarine telegraphy.—T. Deane. Manufacture of artificial marble.—W. C. A. Rœttger. Manufacture of artificial marble.

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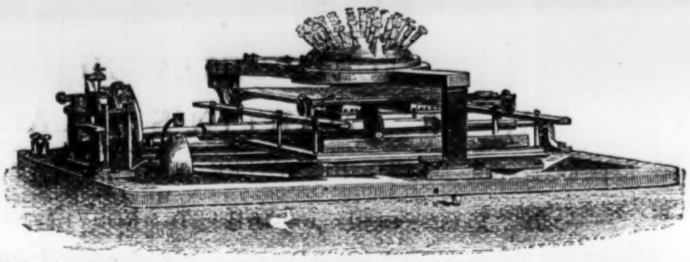

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